

# Smarter Irrigation for Profit

CASE STUDIES

This Project is  
supported by funding  
from the Rural R&D  
for Profit Program



**Australian Government**  
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## PARTNERS





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The project, *Smarter Irrigation for Profit*, is a partnership between the major irrigation industries of cotton, dairy, rice and sugar, and was led by the Cotton Research and Development Corporation (CRDC) in conjunction with Dairy Australia, AgriFutures Australia, Sugar Research Australia and research partners including; CSIRO, NSW DPI, USQ, TIA, SARDI, DEDTJR Victoria, Gwydir Valley Irrigators Association and other industry organisations.

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# Smarter irrigation in the field

An expected outcome of the *Smarter Irrigation for Profit* project was the adoption of new irrigation technologies and science application by farmers and irrigation professionals to improve farm profits.

In just under three years, the *Smarter Irrigation for Profit* project is realising significant benefits for irrigators as they implement management strategies from research findings and technology trials. Growers have learned from being directly involved in setting the direction for research on optimised farms and key learning sites or from visiting these sites and learning about the research through various other avenues or events. Benchmarking, machinery evaluations and pump monitoring undertaken under the project has also yielded benefits for irrigators.

## Glen Price, cotton grower

St George, Queensland



Cotton grower Glen Price (left) is using canopy temperature sensors for irrigation scheduling at his farm in St George, Queensland. Source

## Steve Carolan, grower / Andrew Greste, farm manager

“Waverley” Wee Waa, NSW



It takes just one person to irrigate cotton where seven were once needed with the help of automated irrigation and a move to smart siphons at Steve Carolan's property “Waverley” near Wee Waa in North West NSW. There is 200 hectares under full automation with small Pipes Through the Bank, which have now been set up across the 2200 hectares of irrigated country at “Waverley”. After seeing automation in action at another demonstration site at Moree, Steve and farm manager Andrew Greste initially converted 100 hectares from traditional siphons to a fully automated system. It consists of small pipes through the bank and a series of gates in the channel delivery system which can be remotely monitored, opened and closed by mobile phone. Working under the project with Dr Joe Foley of USQ, the system has been expanded and refined. Steve says the advantages are labour savings, improved uniformity and water use efficiency.

### COMMENTS FROM THE FARMER

“We need better data for better scheduling and the bigger the farm the more data you want.”

“You have to integrate different types of information, as you can't ask the plant.”

“You can measure the soil water, which is an indirect measurement. I can check them every five minutes if I wanted to.”

“These are the most common tools and the most affordable ones at the moment.”

“Then you have canopy temperature which is the most direct measurement.”

“I receive this output once a week, but hopefully it will become something that I can have access to all the time, which would be really helpful.”

“The graph I receive is really understandable, and I would be happy to pay a fee for continuous access, as long as it is not excessive.”

“Being able to have a graph considering soil moisture and canopy temperature to know when to irrigate would be very handy.”

### COMMENTS FROM THE FARMER

“This is not cheap to set up, but we can justify some of the expense over time in terms of savings in labour and improved water use efficiency.”

“This is turn-key irrigation - we easily irrigated with one man where once we'd need seven.

“In terms of water use efficiency these fields have also gone from a 36-hour to 24-hour turnaround.

“Our supply and return channels are monitored so we know when to turn our pumps on and off.”

### Vic Rodwell, dairy farmer

Boyanup, Western Australia



#### COMMENTS FROM THE FARMER

*"Using soil mapping tools, variable rate irrigation and variable speed pumps has allowed me to reduce my feed costs under the 100 ha centre pivot area. I grow kikuyu under the pivot and have reduced cost from around \$240 to \$130 per tonne of dry matter."*

Western Dairy

### Rob Bradley, dairy farmer

Cressy, Tasmania



#### COMMENTS FROM THE FARMER

*"We're putting the water where it needs to go, we're using less power to do it, and we're growing more grass."*

Mark Horstman

Rob Bradley has increased pasture production by 200 tonnes over 117 hectares with variable rate irrigation under centre pivots. This was achieved through better irrigation scheduling to keep moisture in the root zone for optimal growth using less water. More pasture means less supplementary feed costs and better use of water and energy. With these savings the researchers calculated that the payback time on installing the VRI technology was reduced from nine to two years.



## Rex Tout, dairy farmer

Tamworth, NSW



Marguerite White

Rex became involved in the project as an optimised dairy farm.

An expert Technical Working Group provided both strategic direction and technical advice to the project. Based on results from monitoring and assessments, gains improvements on this site included a 21% reduction in the cost of power simply attributed to a correction in the way power was metered, 60% reduction in power use by the irrigation pumps, and an increase of average pump efficiency from 29% to 68%.

As a percentage of annual farm milk income, power costs to pump and place water reduced from 2.93% to 1.8% in one year. In 2015/16 the business was paying \$15.74/1000L of milk produced for power to irrigate compared to a reduction in 2016/17 to \$8/1000L.

The project provided opportunities for local farmers to receive real-time soil moisture and rainfall logging data as well as introducing them to available technologies such as the SID to better inform their own irrigation decisions.

## Aaron Linton, sugarcane grower

Ayr, Lower Burdekin, Queensland



Brad Pfeffer

Automation of furrow irrigation has allowed Aaron Linton to better balance a busy business and family life with farming – and also deliver productivity and efficiency.

The Burdekin farmer had already seen the benefits of irrigation automation from the work he had done installing a drip system at his Leichhardt farm. So when the opportunity arose to expand the automation to his furrow irrigation on the same farm, he jumped at the opportunity.

He encouraged anyone who was interested in automation to calculate, factor in and value their own time.

### COMMENTS FROM THE FARMER

*“Even if I save three trips per week, this equates to 11,000km per year, and in reality I was saving a lot more than that without even fully realising it.”*

*“That equates to about 110 hours or a whole month of work for someone in a nine to five job, so that is a lot of time that I can spend on other businesses, family, my own time, or being able to sleep at night.”*

*“It does seem expensive when you are going to install it, but the benefits are worth it.”*

*“With electricity, if you miss the changeover for a tariff, the cost can switch from say 17 cents to 48 cents.”*

## Andrew Farr, dairy farmer

Denman, Hunter Valley, NSW



Hunter Valley dairy farmer Andrew Farr says a trip to the North-West's cotton and grain fields was a very worthwhile experience.

Andrew and Christie Farr run 400-head milking operation, with irrigated pasture, and dryland cereal cropping on their 960-acre farm "Rossette Park" at Denman.

The dairy farmers were from more southern areas of NSW, and toured cotton farms, grain research facilities and the CRDC head office in Narrabri.

Andrew said a big message was the need to monitor and measure to manage.

### COMMENTS FROM THE FARMER

*"There is definitely a lot more monitoring going on down that way."*

*"I think in that environment, water scarcity and price has driven a lot of improved water use efficiency, which includes better and more monitoring."*

*"It was quite obvious and made clear throughout this tour of the need to measure water use."*

*"When the time is right I will be putting in place the technology to do this."*

*"I can see how irrigation technology will allow us to make gains in our systems, with improved efficiencies, even on a small scale, making all the difference."*

*"Whether you're a big business or a one percenter, incremental savings through better efficiency all add up and can make all the difference."*

*"It may not push up your top yield so much, but will bring up your bottom yields – that's where you get your biggest gains."*

*"Improving your average across the board is how we do it."*

## Hoffman family, dairy farmers

Warwick, Queensland



David Hall

### COMMENTS FROM THE FARMER

*"A commissioning audit of the pivot found that both the water application depth and the uniformity could be improved."*

*"As a result of the Smarter Irrigation project we have made changes to our practices and are now producing more feed from the same amount of water."*

*"The project also assisted us to address a range of soil constraints that were reducing our crop yields."*

## Mick Giumelli

Western Australia



Western Dairy

### COMMENTS FROM THE FARMER

*This [Smarter Irrigation for Profit Project] was an easy, insightful and enjoyable experience. The main thing I have learned is that water application and the right timing go hand in hand. I have also learned that technology is a farmer's friend and will aid us immensely going forward."*

*"I also would like to plant the lablab again, but over a larger area and implement it into our system. I am also open to trialing other crops."*

## Wayne Saward, dairy farmer

South Riana, Tasmania



Mark Horstman

### COMMENT FROM THE FARMER

*"The timing of everything was the biggest learning for me. It's possible to over irrigate and under irrigate on this site, I also understand more about readily available water (RAW)."*

## John and Karen Hunt, dairy farmers

Allendale East near Mount Gambier South Australia



Dairy News Australia

### COMMENTS FROM THE FARMER

*"I thought the soils were causing the waterlogging but a catch can test showed the pivot was inefficient. This was costing us over \$14,000 in lost production."*

*"It was easy to go to the bank for the money to replace the sprinkler pack and regulators - payback was less than a year."*

## Gwydir Valley Irrigators Association

Moree, NSW



Each year the Gwydir Valley irrigators Association (GVIA) has held a major field day to explain their key learnings to hundreds of irrigators and farm advisers. They have produced videos and fact sheets that can be found on their website.

GVIA's trial and key learning sites have been integral for researchers to implement research and then as tools to extend the knowledge more broadly throughout the rice, cotton, sugar and dairy industries.



## Russell Jordan, sugarcane farmer

Burdekin, Queensland



Brad Pfeffer

Russell Jordan farms sugarcane in North Queensland. On one farm which is 104 ha his irrigation system is 100% gravity operated meaning it requires no mains power for pumping. His farm is an example of automation on a gravity feed system. There are five automated valves and a series of sensors in the field which switch on and off the water. Russell's motivation was to eliminate runoff as water is expensive.

He needed to visit the farm several times a day when irrigating, but automation allows him to visit once a day and importantly when it suits him, rather than when the water needed changing. Russell's water and time savings and increased confidence in automation are encouraging him to adopt more automation.



<https://sugarresearch.com.au/caneclip/automation-furrow-irrigation-russell-jordan>

## Ray Thornton, maize grower

Numurkah, Victoria



Melanie Jensen

Ray Thornton talking about the impact of irrigation schedule on plant development and the seasonal differences he saw at this site due to differences in timing of the hot weather between the seasons.

The outcome of this site is that Ray and one of his neighbours have changed their irrigation schedule to what was our 'short' deficit because of increased grain yield and also because our work here with soil monitoring highlighted that with the fast watering automated system he was not refilling the soil water profile properly. He was sceptical of the reduced deficits at first but has now put the irrigation management across the farm. He went from a seven to a five day turn around.

### COMMENT FROM THE FARMER

*"I've gained so much it has been great working with them (SIFP) and am pleased I spent the money on the technology."*

## Nigel Brock, dairy farmer

Montana, Tasmania



Melanie Jensen

Nigel Brock and researcher James Hills of the Tasmanian Institute of Agriculture have been working to improve irrigation efficiency with centre pivots, variable rate irrigation and the VARIwise platform.

### COMMENTS FROM THE FARMER

*"I learned a lot more about how to use the VRI on my pivot. I've learned to look at evapotranspiration figures from the Bureau of Meteorology and found that soil moisture sensors are a useful method for identifying when to commence irrigation at the start of the season."*

*"The result of the VRI working effectively has saved water mainly because the water is used in the right place and at the right rate, not wasted on roads and drains etc. Using the VRI we can also differentiate between the sandy hills and the clay loam flats and apply the correct irrigation amount to maximise pasture production in both areas. In the past with conventional pivots this was a real balancing act."*

*"Throughout the project we have become more aware of the importance of the design, measuring, mapping and energy components of irrigation. Knowing what you have got and how to use it can be a big advantage. The project team helped explain all aspects of using the technology to full advantage. We were doing an okay job of irrigating prior to the project but a much better job after. So much so that we will definitely be using VRI technology on the new pivot."*



## Mahesh Singh, dairy farmer

Gippsland, Victoria



Sarah Killury and Alexis Killoran

### COMMENTS FROM THE FARMER

*"The irrigation timers are the best thing to have happened to the irrigation system on this farm. I have time to spend with my family, and I don't have to be up at all hours through the night."*

*"In the future it is a lot more attractive to workers to have some irrigation automation on the farm."*

*"However, the channels have to be clean, and you must keep to the same pattern of irrigation or else all the timers need adjusting."*

## Terry Wilson, dairy farmer

Donovan's Dairying, South Australia



Monique White

### COMMENTS FROM THE FARMER

*"We installed a range of soil moisture monitoring for the Smarter Irrigation project."*

*"At the end of the irrigation season it enabled me to decide if we could wait an extra day before irrigating."*

*"Getting it wrong would cost us pasture, all I had to do was check the graphs using my phone and I could make an informed decision."*

## Nick Ryan, dairy farmer

Gippsland, Victoria



Peter Day

Farm manager Nick Ryan – second from right) and research team Amjed Hussain, Des Whitfield and Andy McAllister



Peter Day

Automated outlet riser from a pipe source.

### COMMENTS FROM THE FARMER

*“My irrigation practice has generally been conservative because I generally wanted to irrigate a day before that which is indicated from the experimental system.”*

*“I have also tended to have irrigation durations longer than what the model is indicating.”*

*“It’s been a good learning process for me and the researchers to try and refine our irrigation practice.”*

## Denis Pozzebon, sugarcane farmer

Burdekin, Queensland



Brad Pfeffer

### COMMENTS FROM THE FARMER

*“Through a Sugar Research Australia project I became involved because I have always had an interest in automation of irrigation and saw that it would be the way of the future.”*

*“The experience with this project has been a real eye opener and has been everything I have expected, probably more.”*

*“It starts with an improvement to social life by being able to spend more time with family and to be able to travel away and not worry about irrigating this section of the farm.”*

*“It has also included savings to water and energy.”*

*“It is an investment in the long term that has to be looked at over five to 10 years. It may not stack up in the short term, say two years, but with energy prices skyrocketing every year and water prices going up, I see this as an investment in the future.”*



## Mat Stott, cotton grower

Point Farms, Darlington Point, NSW



Iva Quarisa

Field days at Mat Stott's 'Point Farms' at Darlington Point have provided valuable information to farmers new to cotton.

At a key learning site in the Griffith region, using data from a three-year trial, altering his cotton irrigation schedule to a seven-day strategy has resulted in between three quarters and one bale/ha greater yield for Mat Stott.

### COMMENTS FROM THE FARMER

*"Coming from a corn growing history, we were using similar scheduling and tended to water our cotton too often."*

*"As a result of the trials we have changed our irrigation scheduling, which has resulted in roughly three quarters of a bale more yield."*

*"What was surprising is that we found we were causing a yield penalty from overwatering."*

*"Working on a seven-day cycle, but still tailoring watering to the weather and climate, we will slow down or speed up when we need to."*

*"Every farm is different, so what we are trying to show at these sites is that you can adapt what you see here to make it work on your farm."*

*"I think the site has been beneficial for the region in terms of giving interested growers and researchers access to the crop first hand."*

*"By being involved we have had outside agronomists and other researchers come onto the farm at field days and individually to look at the wider cropping area, and they all bring information to us."*

*"I'll be continuing irrigation research here with some of the current partners after the Smarter Irrigation Project finishes up."*

## Antony Vagg, farm manager

Rice Research, Jerilderie, NSW



Melanie Jensen

### COMMENT FROM THE FARMER

*"Being a part of the trials has inspired us to undertake further research into rotation options and short season rice varieties to take advantage of soil moisture after harvest."*

## Going places: Looking outside the farm, region and industry

A key aspect of uptake and extension has been field days, group and individual visits and research tours to key learning sites and optimised irrigation farms.

The events at these sites serves growers from the industries in two ways. Firstly, it gives producers within industries the opportunity to learn from the researchers and growers from their own and other regions. In some cases it's learning from your neighbour or a producer on the other side of the country.

Secondly, the tours have facilitated important cross-industry information sharing. Under the project, sugar producers have visited large broadacre cotton farms in North West NSW, dairy farmers have travelled interstate and into the cotton and grains regions and rice growers have made several trips to visit the key learning sites at Moree, Wee Waa and South-East Queensland.



Examining soil structure and water holding capabilities has allowed for the implementation of variable rate irrigation at Rob Bradley's farm at Cressy, Tasmania. The findings of the research were presented as part of a dairy industry field day in February 2018.



Irrigators from the sugar industry in North Queensland, rice and cotton growers from southern NSW and cotton growers from all regions of Australia have had the opportunity to discuss all things irrigation at the Gwydir Valley Irrigators Association and Smarter Irrigation for Profit field days at Moree in northern NSW.



Rice and cotton growers from the Murrumbidgee and Griffith region on tour to North West NSW sharing their experiences and learning about automation, field configuration, and the relationship between nitrogen and irrigation. Growers from the southern regions have made several trips to visit the key learning sites at Moree, Wee Waa and South-East Queensland.



Sugarcane farmers made the long trip from the Burdekin to Moree's cotton farm key learning sites, where they saw automation research in the field and talked to leading researchers and technical experts.







Melanie Jensen

Dairy farmers from around NSW and researchers visiting The University of Sydney's Plant Breeding Institute at Narrabri in Northern NSW. "It made us think of new ways to increase our efficiency in our use of water and solar. It was great to see cotton farms up close and see how the laterals and pivots work." - Vernon Brown, Wingham farmer.



Melanie Jensen

Learning about automated irrigation in action at Moree, NSW, from farm manager Ray Fox at a joint GVIA and CottonInfo field day where technology being tested through the project is on show



Melanie Jensen

Dairy farmers from the mainland states out and about on the coast at Rocky Cape, Tasmania. This site showed the true variability of soils types irrigators contend with, and how best to manage them in terms of water use efficiency and pasture growth. The sand dunes visible in the distance are an indication of the extremely sandy soil. Farm owner Luke McNab is managing water use through earthworks and gaining a better understanding of his soil.

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Melanie Jensen



Guy Roth

Some of the Smarter Irrigation team.



