Spray irrigation
Waverly Pastoral Company
Bundalaguah

AGRICULTURE VICTORIA

Macalister Irrigation District Irrigation Incentives Program

Alex McArthur and Modabber Khan admiring the pivot.

AT A GLANCE

Project: Flood to spray conversion

Area: 36 hectares

Soil type: Moderate permeability

Water source: River diversion and reuse system

Production: Significant increase

Stock numbers: Tripled

Project cost: $138,314

Incentives rebate: $12,472

Project cost per hectare: $3,842

Automated: Remotely operated

Manual labour: Significantly reduced

"Compared to the previous system our water use is going to be higher as we irrigate a lot more frequently and consistently across the whole area." Alex McArthur

KEY BENEFITS	Previous system 1 season data	Current system 5 seasons data	Difference
Area irrigated (ha)	36	36	-
Flow rate (ML/day)	6	5	- 1
Average water use per irrigation (ML)	5.5	12	+ 6.5
ML/ha/irrigation	0.15	0.33	+ 0.18
Irrigation hours per season	689	1297	+ 608
Pasture production (T/DM/ha)	Unknown	12-13	More!
Cows milked	110	350	+ 240

"You couldn't irrigate the farm as it was, the layout of the irrigation system was too inefficient and so in terms of labour costs it was not viable at all" Alex

West Gippsland Catchment Management Authority

EFS Agricultural

THE FARM

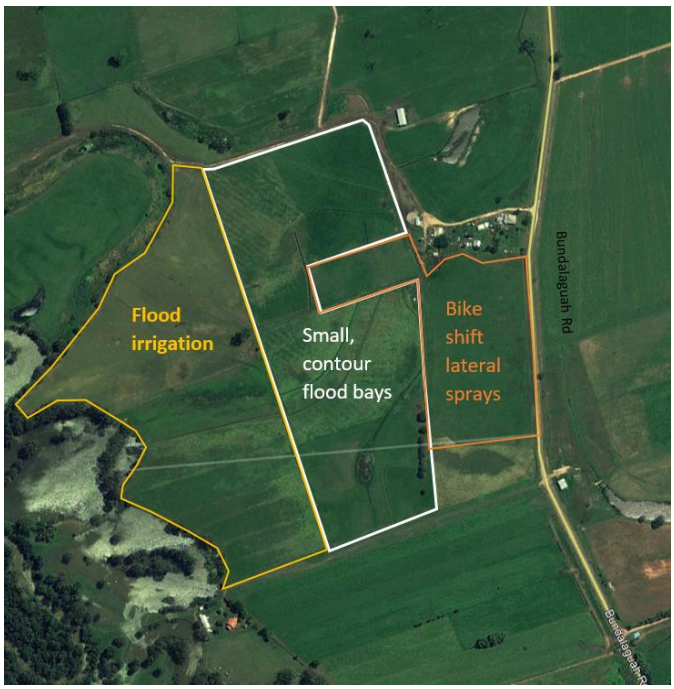
Alex and Olivia McArthur from Waverly Pastoral have been growing their dairy farm in Maffra. After purchasing their home farm, they have been purchasing and leasing properties nearby. They are now up to 800-850 cows in total, milked across two dairies. Alex already had experience with installing and operating pivots as he has 3 pivots on his home farm. Waverly pastoral purchased 'Dingwalls' dairy across the road in 2013 on 95 ha. It's currently milking 350 cows and predominately irrigated by a pivot that was installed in 2013, as well as flood irrigation.

IRRIGATION SYSTEMS

Previous system

Previously the farms irrigation system comprised 31 ha of wild flood, and 5 ha of bike shift laterals. The flood irrigation system was old style, with low flow rates of 6 ML, many small bays, and no uniform paddock sizes. The small bays and high number of small outlets meant that the flood system was very labour intensive, with outlets constantly needing changing, day and night. The intensity of the irrigation was uneconomical to continue, as staff costs would soon overrun the benefits of the irrigation for the business.

Some higher areas of the paddocks were unirrigated, and some low areas suffered extensive waterlogging periods because of poor grading and drainage. Runoff from the flood irrigation system was lost down the laneway, resulting in no water or nutrient capture for the farm.



2010 map showing the old irrigation system.

Current system

Alex McArthur made the decision to upgrade the irrigation system from flood to spray when he bought the farm in 2013, knowing that the irrigation system was both too inefficient and too labour intensive. Alex completed an irrigation farm plan with full costs of the project calculated. From the plan, Alex made the decision to install a poly lined 6 span centre pivot covering 36 ha, with a swing arm to incorporate more area. The pivot is supplied by a farm storage that captures all the run off from the Dingwall farm.

The main considerations that lead to the decision to install the pivot were:

- reduced labour inputs
- increased water use efficiency
- greater pasture production
- the ability to keep nutrient on farm by running effluent though the system.

"The pasture has averaged 12-13 tonnes of dry matter annually since the farm has been taken over, which is a significant improvement when compared with past management." Alex

2016 map showing the area covered by the new pivot and where the pivot bends to cover more area.

LABOUR CHANGES

Previously, the combined flood and lateral system was uneconomical to run due to the labour required. The irrigation system would run for 689 hours over the 2013/14 season, and of these hours, a great majority would have been spent changing outlets all day and night.

The upgrade to the pivot dramatically reduced the labour input required. The pivot is automated, so it is possible to turn it on and off via a computer or mobile phone, so Alex does not need to be on farm to start irrigating. While the pivot is running, very little labour is needed, other than a quick glance to ensure it's operating. The number of hours the pivot runs per season is 1,297 hours, but most of these hours require no labour input from staff.

The area under the pivot has also been fenced to assist with stock movement and pasture management, further reducing the amount of labour required for the area.

In addition to the savings that are being gained from less intensive labour the pivot is being operated purely on off-peak power, reducing the cost of operation.

With the pivot, the irrigation is much simpler, and the farm manager has full control over the irrigation. This means that Alex does not need to be on the farm when irrigation occurs. This allows for an improved work-life balance for the young family.

WATER USE EFFICIENCY

The high areas across the farm that were ineffectively flood irrigated, and the low areas that were water logged, are now irrigated uniformly by the pivot. The pivot can apply smaller amounts of water much more frequently than flood irrigation, leading to optimum soil moisture levels and maximized growth of pasture. The pivot applies on average about 15 mm per hectare per irrigation, with Alex able to vary this amount between 9 and 20 mm, depending on pasture water demand.

The flexibility of the storage dam allows for the pivot to be operated at any time of the year – which is fantastic over a dry winter. The ability to irrigate throughout the winter as required to boost production and ensure a feed wedge coming into the Spring was a great bonus with the pivot.

PASTURE PRODUCTION

Since purchasing the farm, the pasture production has been measured and has seen dry matter production of 12-13 TDM/ha annually. The pastures across the area remain as unimproved older perennial stands. These are performing very well under the new irrigation system. Alex attributed the increase in production to better, more efficient irrigation and more effective and easier management across the area.

Previously the pasture production was reduced significantly due to waterlogging and as a result, more summer weeds previously crept into the pasture. With extensive drainage works completed the weed burden has significantly reduced, increasing favourable species across the area.

Soil structure has also been improved through the improved drainage.

NUTRIENTS ON FARM

Under the previous flood irrigation system, runoff ran down the laneway and off the farm. The conversion to spray irrigation resulted in this run-off no longer occurring, and more nutrient kept on farm and not lost to the environment.

The dairy effluent is being used through the pivot so that it is spread evenly and regularly across a large area, limiting run off, reducing fertiliser use and keeping even more nutrients on farm. Being able to apply effluent through the full 36 ha pivot allows for easy management of the effluent system.

The fertility of the pasture has also been improved, with the nutrients in the soil increasing significantly and are now in the optimum range (October, 2018). Previously, the nutrient levels across the area were a major constraint. The increase in the nutrient status across the area can be attributed to some fertiliser inputs as well as the re-use of effluent through the pivot.

"There is nothing leaving the farm in terms of nutrient, all effluent is being reused through the spray irrigation system to return the nutrient to the paddock," Alex

LESSONS LEARNT - ALEX

- Hindsight is a wonderful thing, but we needed to get cows grazing the area to get the milk in the vat and start to get a return after purchasing, looking back I would have done more work at the beginning if I knew then what I know now.
- The ability to dry walk the pivot has been a major benefit as there is no double up on the amount of water being applied to the same area twice in a row.
- "In hindsight, more work should have been done to renovate pastures when putting the pivot up, however given it was winter I was apprehensive about moving soil on a flood plain."

- You cannot afford not to have good drainage of the area to avoid wheel tracking and bogging.
- From a lifestyle perspective the ability to turn the pivot on remotely has helped staff to irrigate effectively.
- Drainage is key to good pasture production and it needs to be a priority when developing a new project.
- Efficiency gains have come from the ability to irrigate overnight as required and reduction in actual labour required.
- There is no point having an end gun on a pivot unless it has a booster to more evenly distribute the water, as before the booster was put on areas that were missed.
- Do it properly to start with and it will save a lot of headaches. The right rate, at the right time, with the right machine, otherwise you miss too many opportunities to grow the grass.

FUTURE

Alex thinks pivots are the way to irrigate his farm and he is busy planning for the next two pivots to install. Alex is also looking at upgrading the pump on water storage to spec to reduce running costs.

SUMMARY

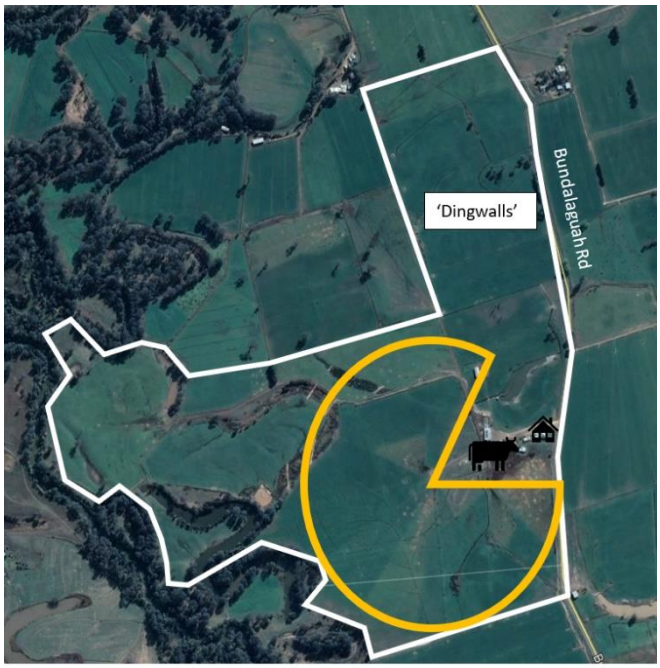
Through the utilisation of the pivot, the pasture production on farm and stock management and grazing efficiency have improved significantly. Stocking rate has tripled, and labour time has decreased. The saving of labour with the pivot has enabled the remaining irrigation systems on the farm to be used more efficiently, further boosting pasture production.

From a lifestyle perspective the pivot can be managed from afar making it easy for staff and managers to correctly schedule irrigations through the summer period.

Acknowledgments

Thank you to Alex from Coonmoor Farms for sharing their story with us.

This fact sheet was created using information compiled by Liz Shotter from EFS Agricultural with the help of Agriculture Victoria.



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