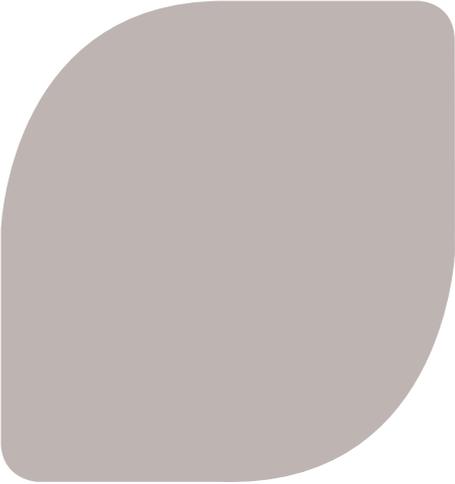


Ag Innovation and Technology in the Western region



Landholders in the Western region are hardworking, resilient and dedicated to the land and environment they work in. They are intuitive, deep thinking and apply knowledge that has been gained and passed down for generations.

An attribute that is not generally associated with landholders from the Western region is innovative, however, this couldn't be further from the truth. Through the adoption of new practices and technologies, landholders in the Western region are leaders for their industries and are benefiting from their openness and willingness to implement new resources, tools and ideologies into their business.



The four case studies featured in this publication are examples of the innovation and technology that is being implemented by landholders across the Western region. The case studies were supported by Western Local Land Services through funding from the Australian Government's National Landcare Program and Catchment Action NSW.

Types of innovation in the Western region

Landholders in the Western region are continually looking to employ innovative techniques to increase their productivity and profitability.

There is a range of benefits to being innovative and embracing technology.

A survey that was conducted by Western Local Land Services, the *2017 Regional Landholder survey*, provided a number of key insights into the conditions landholders are operating in and the value of being innovative and open to new farming techniques.

The survey reported that the average property size in the Western region is 10,500 hectares.

With conditions becoming increasingly variable, change has become more common to producers in the Western region, with a third of landholders reporting to have changed their enterprise in the past 10 years.

This has mostly included a change to livestock breed and an expansion in production.

As 32 per cent of landholders in the Western region do not live on their property full time, the need for innovation to improve efficiency in management is increased.

This is particularly important for routine activities such as water runs.



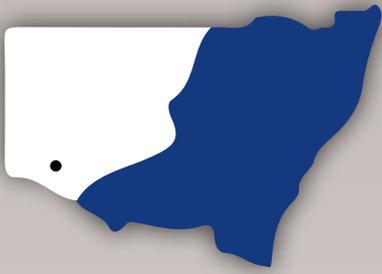
To adjust to these factors, landholders have implemented some of the following innovations:

- Drones for surveillance, mustering stock, checking water and monitoring land condition.
- Solar pumps to increase the reliability of livestock water to improve animal welfare outcomes and increase the ability to manage grazing pressure.
- GPS systems for improved accuracy and precision farming to increase the efficiency of resource use.
- Telemetry systems to reduce time and costs associated with monitoring water.
- Soil moisture monitoring systems to improve the accuracy of irrigation systems.
- Livestock handling equipment to accurately record production data such as weight gains to improve pasture use, herd quality and ability to meet market specifications.
- Desalination plants to improve the quality of water for livestock consumption.
- Agricultural management software to help manage the property to achieve greater productivity by improving soil health and grazing capability, as well as record keeping. For example:
 - AgWorld™ to enable greater sustainability through maximised pasture productivity and groundcover management along with improved soil fertility.
 - FarmMap4D™ to enable groundcover to be monitored at paddock level and decisions made using the information.

There can be a number of hurdles to embracing innovative techniques. One such issue in the Western region is connectivity, which continues to be a major limitation to production. Twenty three per cent of landholders do not have internet access on their property and of those that do, 45 per cent report it to be slow or very slow.

**The data gathered from the 2017 Regional Landholder survey is a reflection of those that completed the survey, not all landholders in the Western region. The results and a full report of this survey is available at www.lfs.nsw.gov.au/western.*





Soil moisture monitoring for improved fruit quality

Location

Ellerslie, NSW

Property name

Porker Citrus

Owners

Jim and Kayleen Porker

Enterprise mix

Citrus and vines

Property size

80 ha

Average annual rainfall

287 mm

Key features of the innovation

- Saves water
- Saves time
- Improves fruit quality



Jim Porker.

Porker Citrus is a family owned and operated business located near Ellerslie in south-western NSW.

Owners Jim and Kay Porker, along with their son Andrew, daughter Tamie, and their partners Jodie and Brad, grow citrus and grapes and have done so on the property since 1982.

The Porkers grow oranges for export, with their navel oranges heading to market in China and their valencia oranges sold into Singapore and Hong Kong, while their grapes are sold to wineries in Geelong to be used in cabernet sauvignon.

To remain competitive in these domestic and international markets, the Porkers are constantly looking to improve their operation.

Incentive for the innovation

Continued advances in technology in the horticulture industry provide opportunity to improve the efficiency of production for the Porker family.

The soil moisture monitoring system achieves this by saving water, labour, power and fertilizer to reduce the cost of production. Improved water management also increases fruit quality, which increases profit.

How the innovation works

The soil moisture monitor reads soil moisture level at three depths using a soil moisture probe buried to 900 mm deep. Information is transmitted electronically to a central control box which collates information into moisture charts. These charts are used by the Porker family to determine the time, amount and duration of watering for their various varieties of fruit.



Equipment required

The soil moisture monitor system consists of a control box, soil probes, computer program and subscription. There are currently five soil probes functioning in this system with the aim being to increase this to cover the whole property.



Benefits to the business

The Porkers have found that this system “takes the guesswork out of farming”. This has led to improved fruit size and quality, along with reduced water usage, drainage and costs. This allows market specifications to be more accurately met.

Additional benefits come from more precise fertilizer application through monitoring times of plant water uptake and reduced labour requirements. They are now “doing more for less”.

Benefits to land management

Being long-term producers, the Porkers are always looking to increase the sustainability of their operation. This is particularly important when looking towards the next generation. The soil moisture monitor uses less water than previous tried methods of water management. As a result, the long-term soil health is improved. Additionally, increased precision in fertilizer application reduces unnecessary additions to the soil.

Return on investment

It is estimated that in the short term a saving of \$1,000/ha per year is achieved by using this system. The Porkers are expecting this figure to continue to increase in the long term.

Risks

The Porkers have found that using a soil moisture monitor helps to manage the risks associated with using a drip irrigation system. When using a drip irrigation system, there is increased risk of fruit sunburn, frost and leaching of salts after rainfall events. Using the soil moisture monitor these risks can be managed through precise measurement of the level of moisture in soil.

Overcoming barriers to adoption

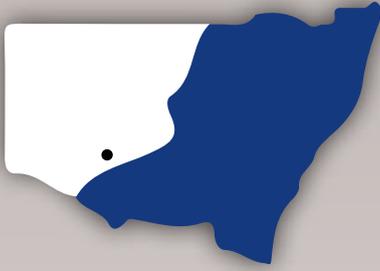
As with every new technology, upfront cost can be a major barrier to adoption. Installing one section at a time is how the Porker family have managed upfront costs. This has allowed smaller levels of investment to achieve the same final outcome. This system requires internet connection and phone reception to work. Regional connectivity upgrades have allowed the system to be used. Internet speed remains a barrier in the Western region.

Due to the nature of setting up the probes, control boxes and software, support from technology companies with installation and setup is required. The Porkers have had several on-site visits and demonstrations to ensure the smooth setup and running of the system.



Next step

Looking forward, Porker Citrus will be a fully automated, filtered watering system to reduce labour requirement and increase production efficiency.



Time saving with telemetry

Location

Booligal, NSW

Property name

Mutherumbung Station

Owners

Pat and Sharon Bunyan

Enterprise mix

Merino sheep and cotton

Property size

12,141 ha

Average annual rainfall

300 mm

Key features of the innovation

- Remote camera monitoring
- Record water level
- Increased reliability of water monitoring



Pat Bunyan and his son Simon Bunyan.

Mutherumbung Station is home for Pat and Sharon Bunyan, where they produce top quality merino sheep and cotton in south-western NSW.

The 30,000 acre property is split into two separate blocks, making the task of checking water for their livestock a time consuming task.

It involves an 80 km round trip that needs to be completed every two days in summer and at least weekly throughout other months.

Incentive for the innovation

In order to reduce the time needed to check water on the second half of the property, Pat decided to invest in a remote water monitoring system. The aim is to reduce travel time, cost and maintenance expenses. This allows more time to be spent watering cotton in times of peak demand, and of course, spending time with the grandkids.

How the innovation works

The observant telemetry system consists of three key components:

- tank level sensor, mounted inside the water tank which records the water level
- external camera which takes a photo of the water trough or surrounding area four times a day
- control box with UHF and telephone communication systems to transmit data between monitoring points and back to the mobile phone app, where the information can be monitored.

The camera can be used to determine if there is an issue with the trough, such as a leak, a blockage or a sheep stuck. This compliments the ability to monitor the water level in the tank to provide a greater benefit to the monitoring system.



Benefits to the business

The Observant™ system has reduced the amount of time spent checking water, which has allowed more time to be spent completing other tasks. It has also reduced the costs associated with travel – in the form of fuel and vehicle maintenance. It is a simple way to increase peace of mind in times where water is in high demand, for example in summer.

Benefits to land management

An indirect land management benefit has been achieved with this system through the ability to place stock feeders in view of the monitoring camera. This has allowed pest species to be monitored, as well as grazing pressure at watering points. From this information, management decisions can be made surrounding pest control to reduce their impact on the environment as well as stocking rate.

Return on investment

The returns for this innovation will be seen mostly in the long term through reduced costs associated with travel. Pat has also found that this innovation acts as a long term health and safety risk management tool. Completing less travel reduces the risk of incidents, especially in remote areas, and helps to manage fatigue.

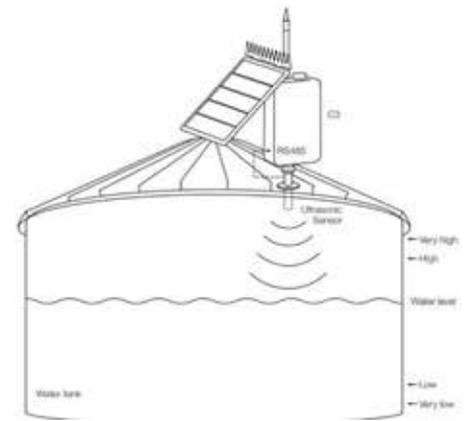
Risks

The main risks associated with this innovation are wildlife, for example birds becoming stuck under the sensor, resulting in an inaccurate reading. Another risk is malfunction in the master system which would result in all systems not working. Drop outs in phone service would also lead to the system not working.

Overcoming barriers to adoption

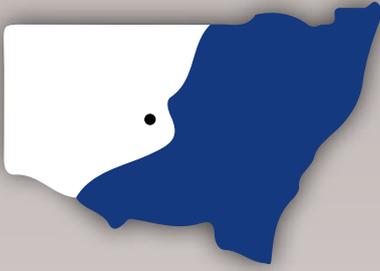
The major barrier with remote telemetry systems in the Western region is connectivity. This innovation has overcome the connectivity barrier as only one monitoring point needs to have phone reception, and this can be from a boosted signal. The system then communicates via UHF signal between units.

Other barriers to the innovation include the distance between monitoring points, which is limited by UHF range, and cost, which has been mitigated through gradual instalments of more monitoring points over time.



Next step

The next step is to install more monitoring points and to place a rain gauge on one of the monitoring points.



Meeting market specifications with weighing technology

Location

Gilgunnia, NSW

Property name

4 Mile

Owners

Mark, Danielle and Pat Ward

Enterprise mix

Sheep and cattle

Property size

8,000 ha

Average annual rainfall

370 mm

Key features of the innovation

- Meets market specifications
- Portability
- Easy to use



Pat Ward and his father Mark Ward.

In an increasing consumer driven market environment, the Ward family were looking for ways to improve their operation.

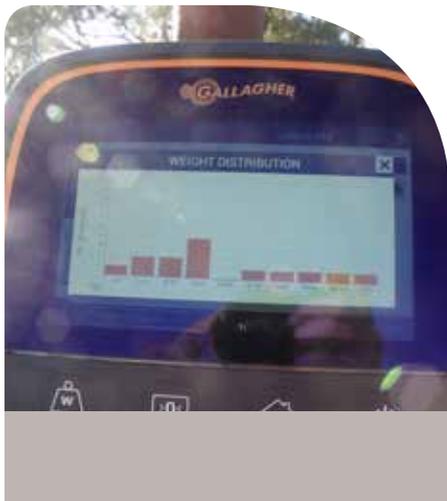
Finding the process of sending livestock to market being riddled with guesswork, as production in the Western region was based largely on qualitative data, the Ward family wanted to provide some quantitative aspect to their business.

Incentive for the innovation

To quantify the value of their livestock and more accurately meet market specifications, the Ward family decided to invest in a set of weigh scales for both sheep and cattle.

Along with the scales, they purchased an EID tag reader and data collector from Gallagher.

The aim is to reduce the guesswork associated with sending livestock to market, as well as allow them to record production data on an individual animal basis in the future.



How the innovation works

The system the Ward family are using consists of the following Gallagher equipment:

- loadbars (2,000 kg) and a TW – 1 Weigh scales for measuring livestock weight
- HR5 hand held EID tag reader and data collector for scanning individual animal tags and recording animal data (for example colour, bad eyes), as well as recording sheep drafting session data and weight ranges
- alloy platform for cattle to be placed in a crush to accurately record weight
- sheep crate three-way drafter to weigh sheep and allow them to be drafted three ways after weight has been recorded.

This system is portable, light and easy to use – the Ward family often use it on multiple properties.

In addition to the data collector, information can be sent via a Bluetooth connection to a mobile app. This does not require mobile reception so is suited to remote western areas.

Benefits to the business

The Gallagher system has allowed the Ward family to market their livestock accurately to specifications.

This leads to an increase in price received for livestock. The information obtained using this system can also be used to guide future marketing decisions, for example, weight gain data can allow the time for finishing livestock to be estimated. From this information an accurate feed budget can be designed.

Benefits to land management

By allowing accurate livestock decisions to be made, pasture usage can be optimised. Having the ability to accurately estimate livestock demand on pasture will reduce the risk of overgrazing through an increased understanding of the grazing system.

The equipment will also ensure livestock are sold when it is optimal, rather than when feed resources have been depleted.



Return on investment

The returns for this innovation are seen mostly in the long term through maximising returns by meeting market specifications.

Long term pasture management outcomes will also be seen through increased efficiency of pasture utilisation.

Risks

The main risks associated with this innovation are a potential increase in livestock stress through being in a confined area (i.e. the crate or crush) for a longer period of time while a weight is recorded.

This risk is managed through the use of low stress stock handling techniques. Other risks are the risks which apply to all livestock handling situations, for example trampling.

Overcoming barriers to adoption

The major barrier to this innovation is cost. This barrier has been overcome by viewing this as a long term benefit, rather than the innovation needing to pay for itself in a single production cycle. Drought and seasonal fluctuations are also a barrier which have been overcome by viewing this as a long term investment.

Next step

The next step is to set up permanent locations for the equipment to allow the scales to be used to draft livestock every time they are being sent to market.



Remote water tank monitoring system

Location

Packsaddle, NSW

Property name

Marrapina Station
The Selection Station

Owners

Rainie Weston

Enterprise mix

Merino sheep, beef cattle and harvesting rangeland goats

Property size

Marrapina 47,862 ha
The Selection 34,412 ha
Total 82,274 ha

Average annual rainfall

250 mm

Key features of the innovation

- Remote water tank level monitoring
- Reduced time spent checking water
- Better management of risk of water failure



Robbie Bujok, Lewis and Gemma Pluckrose.

Marrapina Station is owned by Rainie Weston who manages the property alongside her daughter Jess and her partner Lewis and long term employee Robbie.

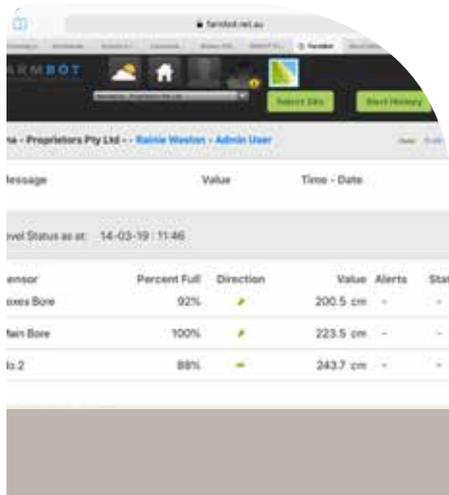
Located approximately 120 km north of Broken Hill the property spans between the Silver City highway and Mutawintji road. Rainie purchased Marrapina Station in 1989, adding The Selection Station to the western boundary in 1993.

Operating in an environment where the property stretches 40 km from east to west and maximum temperatures can exceed 45°C for days at a time, the need to regularly check stock water can consume substantial time and resources.

Incentive for the innovation

Significant reticulated watering systems have been and continue to be developed on Marrapina and The Selection Station. As a result, a number of individual bores and storage tanks are responsible for supplying water to numerous stock troughs. These tanks create critical points in the system.

Equipping three of these water storage and supply points with remote monitors allowed risk to be better managed while also reducing the time commitment of physically



checking them.

How the innovation works

The Farmbot tank monitor consists of three key components:

1. Tank level sensor mounted inside the water tank to measure water height.
2. Rain gauge mounted on roof of tank that measures the movement of particles through a funnel.
3. Control box mounted on roof of tank with satellite or Next G telecommunication systems. This transmits data to the associated computer program and app.

Tank level readings are accessed via a computer interface or mobile phone app. Direct SMS messages are also sent to registered mobile phones when tank levels reach identified critical levels.



Benefits to the business

The three tanks that are equipped with monitors, which were once checked every one to two days, are now checked about every four days. With these tanks located up to 35 km from the house, more time can be spent elsewhere in the business.

The remote monitoring system has also provided great benefits in risk management and associated peace of mind. With one particular tank feeding eight water points, consequences of failure would be significant and occur very quickly. Having 24-hour monitoring of tank levels provides confidence that water is available to stock.

Return on investment

Rough calculations indicate that over one year, the three monitoring units would save approximately 6,000 km of travel to check tanks. When considering the running and maintenance costs of a vehicle and staff time, the return from this alone is substantial. Through early identification of failures, the monitoring system also has a significant return from the prevention of possible economic losses and animal welfare problems associated with restricted stock access to water.

Risks

Risks in using this system relate to becoming complacent and relying on notifications alone. You need to be mindful of checking levels on the app and maintain usual water checks to ensure nothing has occurred at the trough site.

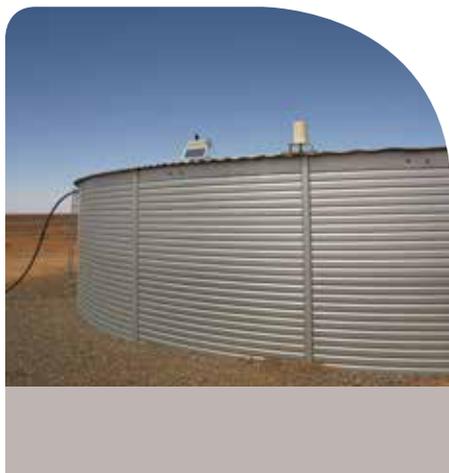
When a large number of troughs are being supplied from one monitored tank, it is hard to detect water level impacts of stock not drinking from a single trough.

Overcoming barriers to adoption

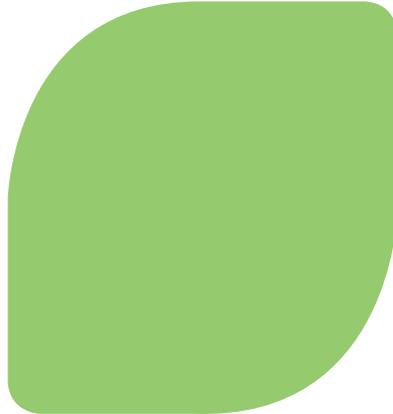
The primary barrier to implement water monitoring systems has been cost. The availability of Western Local Land Services grants contributed to overcoming this. Additionally, Farmbot monitors do not require professional installation, dramatically reducing purchase costs. Due to rain gauge measurements being taken based on particle movement, false readings have been given as a result of strong winds causing vibrations and dust storms passing soil particles through the gauge. By further stabilising gauges, accuracy has increased. Overall, Rainie is very happy with the innovation and has recommended it to a number of people.

Next step

In the future, more tank monitors will be installed, with priority given to critical tanks that supply numerous water points. The addition of a camera in some locations would also be beneficial in identifying potential causes of water level change. Going forward, the pricing structure of Farmbot may limit the number of additional units purchased. This involves a per-unit data subscription and technical support cost. A package deal for larger scale users would make this more affordable. In addition, the replacement of failed probes with new designs more suited to the environment will improve the cost effectiveness of the innovation.



Contact us to find out more



Western Local Land Services has staff that specialise in agriculture, natural resource management and Aboriginal community engagement, along with district veterinarians and biosecurity officers, all of who are based across the Western region.



We deliver quality, customer-focused services to farmers, landholders and the community.

So if you're looking for advice for your ag enterprise, want to carry out some erosion control works, need some animal health advice, want to better manage pest animals or find out more about cultural heritage sites on your property, contact your local office today.



Local Land Services

W: www.lls.nsw.gov.au/western
P: 1300 795 299
E: admin.western@lls.nsw.gov.au

 facebook.com/LLSWestern
 twitter.com/LLSWestern