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Department of Primary Industries and Regional Development

GOVERNMENT OF WESTERN AUSTRALIA

Off the shelf devices that can make a difference to your farm

Sheep Easy 2021

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Mention of product names or use of images does not imply endorsement or recommendation

Outline

- Focus today will be on water monitoring applications
- First step Know and define your problem or limitation and work from there
- Overview on water monitoring supported by SIBI
- Overview of water monitoring sensors installed by 3 young farmers east of Katanning
- · Issues to watch out for
- Recommendations and tips



Case study on Chris Patmore

- Speaker at 2014 Sheep Easy Wickepin event and other industry events
- Clear benefits to the system
- Youtube 'Chris Patmore'. Has had 2500 views
- Go to agric.wa.gov.au/sheeptech



Remote Monitoring

- Plug and play technology
- Set up on star picket facing the trough, easy to move
- Takes photos on set frequency or when required.
- Sim card within the system sends image to the cloud
- Pictures sent to app on mobile phone or other device



- Cost \$22,500
- Savings \$21,400 per year
- Net Present value: \$142,000
- Benefit Cost Ratio: 5.3
- Payback period: 2 years

Hamish Thompson - Farmbot

3G/4G connectivity Tank sensor, rain gauge and flow rate meter

Pros	Cons	mines -
Solid and robust. Heavy duty shrouding on cables.	No app – need to open a web page on your device	
Easy to install. There is a spirit level on the monitor to ensure it is level and correctly installed.	Needs the ability to send a regular email / text when sending alert. The alert needs a pre-set level. (Hamish set at 40cm water). Hamish wants a height and trend regardless of the height of the water.	
Connect up to 5 devices to the monitor	Head office is Eastern States based (Sydney)	
Purchased through local reseller	A level of trust is needed for the rain gauge data – will need to put a manual gauge alongside it to compare rainfall readings.	
Australian made with replacement warranty		

Upfront: \$1190 monitor, \$300 rain gauge, \$900 flow rate meter Ongoing: \$340 / year for monitor, \$59 / year each sensor Future: moisture probe, trough sensors (movable)



Tim Harris – Ellenex sensors

3G/4G connectivity (each sensor has its own SIM) 5 x tank sensors

Pros	Cons
Data available via an app	No volume reading given, just a level. A volume would be good.
Battery powered and lasts 5 -10 years	Alarm is annoying – particularly when filling the boom spray and you are always in front of the re-fill rate of the tank (but it can be easily turned off)
Can set reporting interval – Tim has it reporting every 2 hours	Doesn't appear to be very sensitive.
Can set the alerts to ping repeatedly or just once	Eastern states based – no WA rep
Very simple and easy to move around	Needs a mounting bracket to be built, otherwise there is a slot where a cable tie can be used to attach it to a pipe

Upfront: \$625 for the sensor Ongoing: Cost of data plan on pre-paid SIM Future: Metos weather station; Look at something like Farmbot so other sensors can connect to a central unit





Stephen Barrett – Ecosat Blue

3G/4G connectivity (Blue – cellular, Gold – satellite) Tank sensor, rain gauge

Pros	Cons
Easy to install and use	Higher upfront cost but lower ongoing cost
Very robust and rugged (Australian made)	No room to set parameters in the app
Higher upfront cost but lower ongoing cost	Updates you when it notices a change (not based on a time interval). Stephen would like it to update more regularly (regular time interval).
Gives a history and graph	
Can set alarms / alerts	
Scalable – can other sensors and build a networking using green units	
Used in station country in the NT and has a good reputation for ruggedness and reliability	

Upfront: \$2490 for the Ecosat Blue, \$220 rain gauge, \$690 flow meter Ongoing: \$20/month for data

Future: Install multiple Ecosats for water monitoring to save time checking water





Key considerations

- Keep it simple
- Water Rat[®] (farmo.com.au)
 - Upfront cost: \$749 each
 - Ongoing cost: \$132 / year
- Uses NBIoT
- Multiple applications
- Farmo dashboard
 - View data
 - Set alerts











SCF Smart Farm Technologies Trialled



SCF is road-testing a wide range of digital tools & connectivity solutions across multiple vendors:

- 77 environmental & infrastructure monitoring devices.
- 39 connectivity devices.
- 8 connectivity types.
- 13 device manufacturers.



Smart Farm Technologies in demonstration



Weather Station (above) with Hyper Local Forecasting

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Farm Security Camera (above) Wi-Fi Access Point & Wi-Fi Link





Rain Gauges (Satellite – Above, Cat-MI Below)





SCF LoRaWAN Rain Gauge & 80cm Soil Moisture Probe





Water Monitoring Technologies – economics at Mount Barker Smart Farm







NB-loT Water Level Sensor

4G Water Level Sensor



Water Monitoring Technologies – economics at Mount Barker Smart Farm

- 3 Tank Monitors
 - 2 Ellenex Tank Level Sensors
 - \$642 each + \$88/year connectivity/dashboard fee
 - 1 Farmbot Tank Level Sensor
 - \$1120 each + \$342/yr
- 35km round trip
- 1 hour to complete
- 1.4 trips per week (1 check, every 5 days)

When would the system pay itself off?



*Pricing is approximate & subject to change



Water Monitoring Technologies – economics at Mount Barker Smart Farm

- 3 Tank Monitors
 - 2 Ellenex Tank Level Sensors
 - \$642 each + \$88/yr
 - 1 Farmbot Tank Level Sensor
 - \$1120 each + \$342/yr
- 35km round trip (@ \$0.72/km)
- 1 hour to complete (@ \$25/hr)
- 1.4 trips per week
 (1 check every 5 days)

The system "breaks-even" around the 292nd day of implementation.

	Year 1	Year 2	Year 3	Year 4	Year 5
Labour Cost	\$1,820	\$1,820	\$1,820	\$1,820	\$1,820
Travel Cost	\$1,834	\$1,834	\$1,834	\$1,834	\$1,834
Hardware Cost	\$2,523				
Yearly Ongoings	\$516	\$516	\$516	\$516	\$516
Cumulative Savings	\$615.56	\$3,754	\$6,892	\$10,031	\$13,169

Other Savings/benefits:

- Reduced risk of welfare issues in summer months
- Increased animal insights
- Peace of mind
- Potential to mitigate water supply issues before they occur
- Ability to do other important things



How can I get started?

- Design What problem are we trying to solve?
- 2. Sensor Choice What sensors can I use? What are their limitations?
- 3. Connectivity Solutions what connectivity will I need to implement/improve for efficient use?
- 4. Data Management how will I be able to access this data for meaningful decisions?





What to look out for & consider

- Is there Australian support available? Local support?
- How does it connect?
 - Will I need to implement radio networks?
 - Can I utilise 4G or IoT cellular networks (NB-IoT or Cat-M1/LTE-M)
- How can I protect it? Will it handle the elements? Is it actually fit for purpose? Does it seal?
- How can I make sure its accurate?



Poor protection at connections

Poor connection quality & weatherproofing to sensors

Phil's Handy Hints - Protect it at all costs.....



Accidents happen & livestock also love scratching posts!









Handy Hints!

Flow Monitoring:

- Always try to install flow monitoring sensors away from pipe joins, diameter changes and bends to ensure accuracy.
- Choose the right size sensor for the pipe flow. Large sensors are not suited for low flow rates in

<u>Water Level Sensing (Ultrasonic):</u>

- Always ensure there's sufficient space between the sensor and water level.
 - False "High" Readings can be generated from condensation
 - False "low" readings can be generated from algae flowing between the water level & sensor.

<u>Water Level Sensors (Pendent Style):</u>

• If dealing with muddy water, hang the pendent 20-30cm above the silt layer to prevent pendent blockage.

Take home messages

- Always consider the long-term cost benefits of implementing digital technologies, rather than just the upfront price!
 - Your time & travel is valuable.
 - Consider the "non-dollar benefits" such as:
 - increased workforce efficiency gains or improved animal welfare outcomes.

• Start simple with the basics & work your way up.

- Water level monitoring equipment is the easiest to implement, often paying itself off within 12 months of implementation.
- There are connectivity solutions available for <u>all</u> of Australia. It may be via satellite, radio (LoRaWAN or UHF) or cellular (NB-IoT or Cat-M1/LTE-M).
- Always identify the problem <u>before</u> choosing the sensor.
- Where possible, select a provider which offers more than one solution...to avoid multiple dashboards.
- Ensure sensors are robust, fit for purpose & scalable.
- We need a better approach for delivering information on AgTech
 - Get away from the 'sale-pitch' from multiple solution providers
 - · Case studies delivered by consultants and producers
- Independent AgTech IoT consultants are needed that work separately to solution providers



Need some help? Tools and resources

A wide range of supporting resources are accessible via the SCF projects page:

- Smart Farms Initiative
 - Smart Farms Workshop Manual
 - Smart Farms Calculator

www.scfarmers.org.au/projects

AgTech Finder (agtechfinder.com)

Alternatively, there's also these great resources available:

 DPIRD IoT Case Studies – accessible via <u>https://bit.ly/dpird_iot</u>



We're working fo Western Anstra

Future Farming: the road to real-time remote onfarm monitoring

On-farm connectivity, IoT solutions, platform farm demonstrations Case studies from the eConnected Grainbelt: WA IoT DecisionAg Grant Program August 2020





Smart Farms Workshop Manual Making the most from your system - from start to finish Philip Honey, Smart Farms Coordinator, SCF



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- Future Drought Fund Drought Resilience Program - Department of Agriculture, Water & the Environment (Aus Govt)
- Producer Technology Uptake Program
 AgriFutures Australia



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