

# FORUM

#### For the latest in red meat R&D



# Technology – Easy to Use, Easy to Adopt

Philip Honey Stirlings to Coast Farmers





# **Technology summed up**





Like I.T., AgTech implementation can be stressful for many:

- How do I choose a product?
- How do I get help? Who do I talk to?
- Do they understand my enterprise goals or aims?
- How do I guarantee my success?
- Is it going to cost an arm and a leg?

We want to avoid all of these challenges...and make it easy to use and adopt!





### **Smart Farms Technologies**





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.





## How do I get started?

- 1. **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?



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![](_page_4_Picture_7.jpeg)

# **Step 1 - Design**

![](_page_5_Picture_1.jpeg)

- Identify what problems you are trying to solve?
  - How to minimise running out of water?
  - How do I detect a burst water pipe?
  - How do I improve my workforce efficiencies?
  - How can I get a better understanding of average daily weight gains in paddock?
- Identify where you want to go in the future.
- Identify potential installation locations & map these out!

Notes:

- Not all problems can be solved by technology.
- Identify the problem <u>before</u> selecting the sensor!

![](_page_5_Figure_12.jpeg)

![](_page_5_Picture_13.jpeg)

![](_page_5_Picture_14.jpeg)

# **Step 2 – Sensor/Device Choices**

FARMERS

- Identify which sensors are appropriate for the task.
- Select the sensor that is fit for the job & know its limitations:
  - Accuracy levels?
  - Expected lifetime?
  - Maintenance requirements?
  - What installation tricks are required to get it to optimally operate?
  - Communication protocols
    - Will it work with what I've already got?
    - Can it send email or SMS alerts?

![](_page_6_Picture_11.jpeg)

![](_page_6_Picture_12.jpeg)

![](_page_6_Picture_13.jpeg)

# **Step 3 – Sensor Connectivity Solutions**

There's a connectivity solution for every farm in Australia... even where traditional "coverage" doesn't exist.

![](_page_7_Picture_2.jpeg)

	Mobile		Wi-Fi	Satellite	Radio
Туре	3G / 4G	NB-IoT or Cat-M1	Point to Point	Satellite	LoRaWAN & DigiMesh
Positives	<ul> <li>Good coverageif you're within range of a tower.</li> <li>Best for sending larger data packets</li> </ul>	<ul> <li>Best coverage - Increased range compared to mobile phone coverage. &lt;120km on NB-IoT</li> <li>3 – 4 million square kilometres covered         <ul> <li>5G technology!</li> <li>Up to 10 year battery life</li> </ul> </li> </ul>	<ul> <li>Allows higher bandwidth – great for cameras or extending internet coverage between or within farms.</li> </ul>	Works everywhere!!!!!	<ul> <li>Typically lower ongoing cost where mass device counts are installed.</li> <li>Can be implemented where phone/internet coverage doesn't exist.</li> </ul>
Negatives	<ul> <li>Requires a 'decent' battery to operate the device.</li> <li>3G is phasing out in 2024</li> <li>4G is phasing out in ???</li> </ul>	<ul> <li>Still relies on a Telstra tower within range</li> <li>Not suited for "large messages" Best adapted for climatic, tracking &amp; water monitoring</li> </ul>	<ul> <li>Requires significant power supply.</li> <li>Not really suited for 'low-data usage' devices.</li> <li>Typically requires a "Registered Cabler" to install.</li> </ul>	<ul> <li>Limited update times (can be as bad as 1 message/day, but generally improving as more satellites are launched in due course).</li> </ul>	<ul> <li>Different devices can have different frequency channels, which means compatibility can be an issue.</li> <li>Requires good line of sight to sensor &amp; radio tower.</li> </ul>
Cost	Varies from \$75-350/device, per year.	Low cost per year (\$60-\$120/device)	Once off purchase, typically around \$170 per end plus cabling/install fees.	Varies depending on supplier. <ul> <li>\$120/year rain gauge</li> <li>\$450/year for Farmbot</li> </ul>	<ul> <li>High initial upfront cost (\$500-3500 for radio network), and then either:</li> <li>a very low ongoing cost per device, or</li> <li>Minimal yearly fee for a dashboard with unlimited devices</li> </ul>

![](_page_7_Picture_4.jpeg)

\*All pricing is indicative, may vary or fall under promotion & is subject to manufacturers changes.

![](_page_7_Picture_6.jpeg)

# **Step 4 – Data Management**

How will I be able to access this data for meaningful decisions?

- Mobile App? Text Message Alerts?
- Web Dashboards?
- Via external applications?

Select solution providers that allow you to have multiple options where possible:

- Weather Stations
- Rain gauges
- Soil Moisture Probes
- Tank Level Sensors
- Flow Sensors
- Pressure Sensors
- Safety check-in buttons

![](_page_8_Picture_13.jpeg)

![](_page_8_Figure_14.jpeg)

Iank 1 Water level above maximum limit Water Level : 190.8 cm http://www.farmbot.net.au/LRS-Web1/dbP?mh=513534

![](_page_8_Picture_16.jpeg)

![](_page_8_Figure_17.jpeg)

![](_page_8_Picture_18.jpeg)

# What to look out for & consider

![](_page_9_Picture_1.jpeg)

- Build quality Will it handle the elements? Is it actually fit for purpose? Does it seal?
- Is there Australian support available? Local support?
- Can I share my data externally & implement it in other programs (livestock & farm management software)
- How does it connect? Will I need to implement radio networks?
- Does it meet Australian Standards?
- How can I protect it?

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![](_page_9_Picture_10.jpeg)

#### Protect it at all costs.....

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Accidents happen.

Livestock certainly love scratching posts!

Install barriers!

![](_page_10_Picture_5.jpeg)

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# **Smart Farm Technologies**

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![](_page_11_Picture_2.jpeg)

![](_page_11_Picture_3.jpeg)

Weather Station (above) with Hyper Local Forecasting

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Farm Security Camera (above)

and a stand

Rain Gauges (Satellite -Above, Cat-M1 Below)

![](_page_11_Picture_10.jpeg)

SCF LoRaWAN Rain Gauge & 80cm Soil Moisture Probe

![](_page_11_Picture_12.jpeg)

NB-IoT Water Level Sensor

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4G Water Level Sensor

![](_page_11_Picture_16.jpeg)

![](_page_11_Picture_17.jpeg)

![](_page_11_Picture_18.jpeg)

![](_page_11_Picture_19.jpeg)

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#### Water Monitoring Technologies – economics at Mount Barker Smart Farm

![](_page_12_Picture_1.jpeg)

- 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?

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![](_page_12_Picture_12.jpeg)

![](_page_12_Picture_13.jpeg)

#### Water Monitoring Technologies – economics at Mount Barker Smart Farm

![](_page_13_Picture_1.jpeg)

#### • 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 292<sup>nd</sup> 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

![](_page_13_Picture_12.jpeg)

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#### Water Monitoring Technologies – economics at Mount Barker Smart Farm

![](_page_14_Picture_1.jpeg)

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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

![](_page_14_Picture_19.jpeg)

# Livestock Measurement - OptiWeigh

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![](_page_15_Picture_2.jpeg)

- Objective weight measurement in the field, without human interaction.
  - Minimises cattle movements to yards for weighing = more time grazing.
  - Minimises OHS risks in the field
- Requires an 'attractant' inside the cage to attract the cattle in to get weighed and individual EID.
- Easily movable between paddocks.
- Currently only suitable for cattle, however research is being undertaken for sheep applications.
- Approx. \$16,000 ex GST, with \$240/year data connection fee.

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![](_page_15_Picture_11.jpeg)

#### OptiWeigh in action – SCF MLA PDS - Alternative Forage Trials <MLA PDS project in progress>

![](_page_16_Picture_1.jpeg)

- Pallaton Raphno<sup>®</sup> a cross between kale and radish.
  - Increased palatability relative to forage rape & leafy turnip brassicas.
  - High yielding, with a potential of 4 5 grazings per year.
  - Improved Water Use Efficiency (up-to 38%) & aphid tolerance (up-to 32%) than forage rapes.
  - Graze as early as 50 70 days after emergence.

![](_page_16_Picture_7.jpeg)

![](_page_16_Picture_8.jpeg)

![](_page_16_Picture_9.jpeg)

## A look towards the future – Pasture Prediction

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SCF in conjunction with CSIRO are developing a Drought Resilience dashboard for the Great Southern of WA.

- An easy to read, 'go-to' point to see how the season is tracking for pasture production, against previous seasons.
- Weather information & forecasting
  - Hourly forecasts for next 36 hours.
  - Daily forecasts for next 15 days.
- Soil moisture status.
- Climate resilience information portal.

This program/project is jointly funded through Australian Government's Future Drought Fund and Stirlings to Coast Farmers inc.

![](_page_17_Picture_10.jpeg)

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Australian Government

![](_page_17_Picture_13.jpeg)

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# Take home messages

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- Always consider the long-term cost benefits of implementing digital technologies, rather than just the upfront price!
  - Your time & travel is <u>valuable</u>.
  - Consider the "<u>non-dollar benefits</u>" such as:
    - increased workforce efficiency gains,
    - 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.
- Identify the problem before choosing the sensor
- Technology can objectively alert you to issues before it is too late...whilst helping give you peace of mind.

![](_page_18_Picture_12.jpeg)

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# **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 Implementation Flow Chart
  - Smart Farms Calculator
- MLA Producer Demonstration Site
  - Trials Review Article 2021 Project result summaries

www.scfarmers.org.au/projects

Alternatively, there's also these great resources available:

- DPIRD IoT Case Studies accessible via <u>https://bit.ly/dpird\_iot</u>
- WALRC Many Peaks Forum (Session 5) accessible via WALRC's YouTube Channel.
- MLA Romani Pastoral Co & Carwoola Pastoral Co Smart Farms accessible via YouTube and MLA R&D Reports.

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# **Project Acknowledgements**

The SCF Smart Farms Initiative has been supported & developed through individual farmer contributions and the following respective grant programs:

- WA IoT DecisionAg Grants Program

   Department of Primary Industries & Regional Development (WA Govt)
- National Landcare Program Smart Farms Small Grants – Department of Agriculture, Water & the Environment (Aus Govt)
- Future Drought Fund Drought Resilience Program - Department of Agriculture, Water & the Environment (Aus Govt)
- Producer Technology Uptake Program – AgriFutures Australia

SCF also greatly appreciates Meat & Livestock Australia in their support in our Producer Demonstration Site Program – Alternate forage crops for Southern WA.

![](_page_20_Picture_7.jpeg)

Department of Primary Industries and Regional Development

GOVERNMENT OF WESTERN AUSTRALIA

Australian Government

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