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## **Tech Tools for Improving Productivity, Profit and Pasture in the Pastoral Rangelands**

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### **Abstract**

In the last 20 years there has been a huge surge in development of technological tools to improve the business of producing protein in Australia. While in the early stages this was mostly confined to the cropping sectors, more and more we are seeing the livestock industry embracing technology and the benefits it brings to business bottom lines. Unfortunately the remote pastoral industry has been behind the eight ball due to a combination of harsh conditions, limited access to online service and very low adoption rates, amongst other things. Tech companies have been quite successful in building hardware capable of withstanding the extremes of Australia's hostile climate and gradually, ever so gradually, regional Australia is joining the 21<sup>st</sup> century in its access to the World Wide Web at speeds not totally reminiscent of a slow motion replay. That leaves adoption...

There are now tools available to the pastoral industry that can not only save time and money, but that can also identify inefficiencies, minimize unnecessary production losses and monitor pasture condition and availability to better manage our grazing ecosystems. The PPMS (Precision Pastoral Management System) is a software system based online via a cloud based network. It draws on multiple data products that are customized to each property. The RLMS (Remote Livestock Management System) collects live weight data and also an auto-drafting option, while pasture production is collected via satellite. Data is streamed back to the PPMS via the telemetry unit. This system is used to maximise animal productivity while minimizing overgrazing and land system degradation. The telemetry units also support other cost saving tools like Tank Level Sensors, Digital Rain Guages, Remote Start/Stop function for motors and many more .

### **Remote Monitoring, Precision Pastoralism, Sustainable Rangelands**

In 2013 we (my family operated beef production business, Glenflorrie Brahmans) applied to be a part of the Ninti One CRCs Precision Pastoral Management Tools research project into the possible role, benefits and issues of technology in pastoral businesses in the Rangelands.

We were attracted to the project by the opportunities we could see such technology bringing to our enterprise. We have been individually identifying our cattle for 25 years and using RFID to achieve this since 2003. Collecting and analysing production data has been part of our management program for most of those 25 years and so we saw the PPMS (Precision Pastoral Management System) as a great way to enhance that process.

The PPMS is a software system based online via a cloud based network. It draws on multiple data products that are customized to each property. The RLMS (Remote Livestock Management System) collects live weight data and also provides an auto-drafting option, while pasture production is collected, in our case, by Landgate via the MODIS satellite. Data is streamed back to the PPMS via the telemetry unit.

The RLMS (Remote Livestock Management System) module consists of a walk-over weigh platform with scale head, a set of 2 drafting gates, an RFID tag reader and a telemetry unit with solar panels and reserve batteries. In our trial we were using a UHF sender unit which sent the data back to the homestead then onto the database via internet. How it works: the beast enters a small enclosure containing the water trough via a set of spear traps, has its drink and then exits via another spear trap then over the weigh platform where its weight

and RFID are captured and stored in the scale head. There are no slide gates or visual baulks on the module so the animal passed through at its own pace and continues out back into the paddock. The ID and associated weight data is then transmitted to the database where it is processed, filed and then uploaded onto the dashboard for analysing. This weight data can then be graphed, either on an individual animal or mob basis.

The pasture production is gathered in a program called Pastures from Space which is owned by Landgate (WA Govt). It produces NDVI (Normalised Difference Vegetation Index) data, which is effectively a “Greenness Indicator” which can be used as a rough guide to relative pasture quality. By monitoring the pasture growth trends and comparing them with real time livestock weights we can far better manage our grazing land as well as livestock production (See graph).

Our experience through the trial was an extremely interesting and educational one. Often my assumptions were challenged and subsequently my understanding and estimations of our land systems capacities has improved. In the first year of the trial I estimated there to be feed available to carry the 317 heifers through until mid-September. As you can see in the graph below, that estimate was grossly optimistic. The heifers finished gaining weight around the beginning of July, plateaued for a month or so then began losing weight. In the 2 months it took me to react to the data the PPMS was giving me, those heifer lost an average of 33kgs/head which equated to \$44.55/head (\$14,122 total) in wasted production. I use the term “wasted production” because we had gained those kgs and then lost them again. This event served to highlight to me just how inaccurate my “best guess” estimations could be and also how valuable the real time live weight data could be in maximising productivity of mobs as well as individual animals.

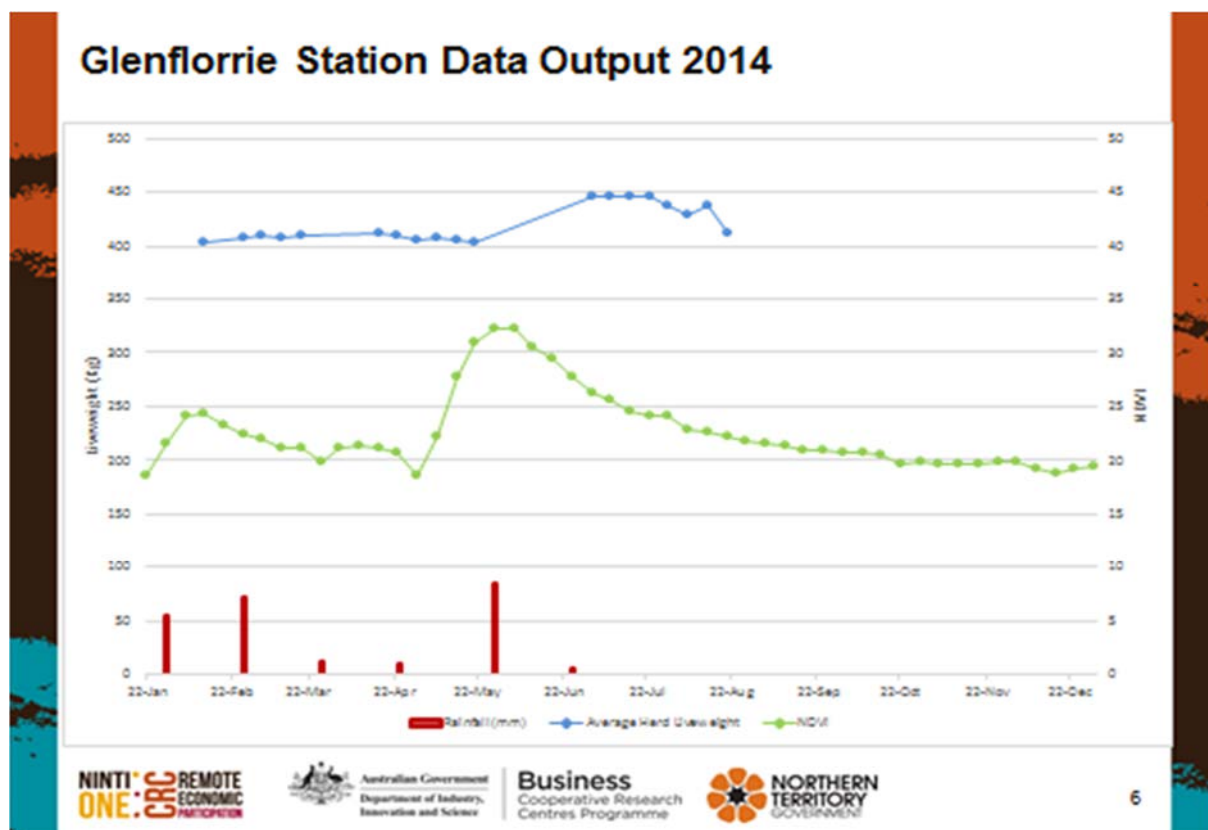
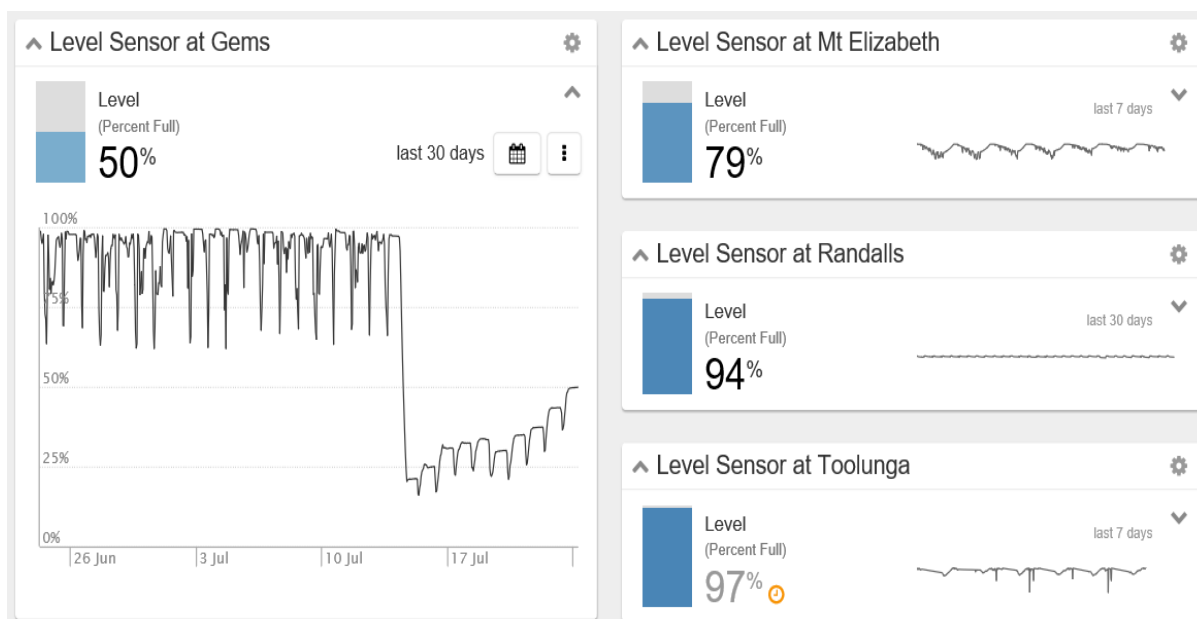


Fig 1 showing 2014 Average Herd Liveweight (blue line) compared with NDVI (green line) and monthly rainfall totals (red lines)

We have also gained the confidence in the data to begin to use the NDVI information as something of a planning tool for feed budgeting and planning paddock moves. Through analysis and observation we know we have an 8-10 week window from the peak of and NDVI curve until cattle begin losing weight. This has made a major improvement in our ability to maximise live weight production while protecting the land systems from over-grazing .

Another notable finding we observed out of the trial was the losses in weight through the handling process and the breaking of routine. In 2015 we recorded a 10.8kg/head (2.5%) average weight loss in mustering and walking the animals 14km to the yards. This was an un-curfewed weight after they spent the night with access to hay and water to simulate night feeding in the paddock. Once the cattle had been returned to the paddock they took 12 days to return to their pre- muster weight. This is where the automated draft function really has the potential to shine. The ability to draft out specific animals at any given time without breaking the daily routine or applying any handling stresses to the rest of the mob is a major boon for any beef producer. We have calculated that, for part of our operation, backgrounding a mob of 400 steers and drafting them out in 100 head lots as they reach specification (live export-370kgs) we should save \$12,240/year just in weight losses through handling and breaking of routine.

Because the RLMS system uses telemetry to send its data, we were able to piggy back onto that with a set of water monitoring equipment. We went fairly basic and have, at this stage, just been running tank level sensors. However the list of equipment that can be run through the telemetry units is quite extensive and includes flow metres, digital rain gauges, digital cameras and engine start/stop controllers amongst others. By implementing the remote water monitoring via Observant telemetry across part of the property we have halved to annual cost of checking and maintaining waters in that particular area. It also gives us the prompt warning when something goes wrong. In the chart below you can see where the ball tap came off the trough and the tank level began falling sharply. This occurred 2 days after the bore was checked and 4 days before it would traditionally have been checked again. Rather than ending up with an empty tank, dry trough and cattle forced to find an alternative water source, or worse, begin to perish, we were able to respond in time to maintain water supply to the cattle.



Our experience with these technologies has certainly been an eye opening one. There have been some teething problems, as there will be with anything in trail and development but ultimately the outcomes have been overwhelmingly positive for our business. It has led us to invest in 4 water monitoring systems across 1 part of our property with another 20 tanks planned to be equipped over the next 3 years. We have also invested in a second RLMS (along with the original one we inherited from the trial) to maximise productivity of livestock and pastures through our paddocks. We plan to invest in 2 more over the next 4 years as we develop more country into paddocks.