

Precision Pasture Management

Case Study

Business name: Nevaome Holdings

Producer(s): Brad Erickson & Dale Burbidge

Location: Bowhill Road, Burdett

Enterprises: Crop & Sheep/wool

Rainfall (annual - average) – 325 mm

Rainfall (Growing Season – average) – 260 mm

Background

Efficient use of feed resources by sheep producers is a major factor in determining farm profitability and sustainability. Pasture utilisation by sheep during the growing season is low relative to total pasture production. In many years total pasture consumption can be as low as 20 to 30 per cent; yet sustainable pasture utilisation of more than 50 per cent is possible. Most producers are unaware of their actual level of pasture utilisation, with many foregoing potential production because of ineffective management of their feed resources. Further, poor management can also lead to environmental degradation

Pastures from Space (PFS) has been a technology available for over a decade, and provides the opportunity for producers to receive estimates of pasture growth rate (PGR) and feed on offer (FOO). District estimates are directly available from www.pasturesfromspace.csiro.au, whilst individual farm data has been available by subscribing to a paid service.

The Precision Pasture management project worked with a small group of producers from the Monarto and Ettrick districts. Working in collaboration with Landgate, the providers of Pastures from Space, a beta version of PFS was used to gather property data. Feedback on the value of this new beta version to producers and the ease of use was then provided back to Landgate. Brad Wooldridge, producer from Western Australia provided his experience with Pastures from Space and demonstrated how he had used PFS as a tool to improve his management and pasture efficiency.

This case study provides details for one of the collaborating properties, Nevaome Holdings.

Pastures from Space

Brad registered to the Pastures from Space service. Once registered, he was required to enter on-line all the paddock boundaries for 'Nevaome'. A few days later he was advised by Landgate that data for his property was available.

Nevaome PFS data

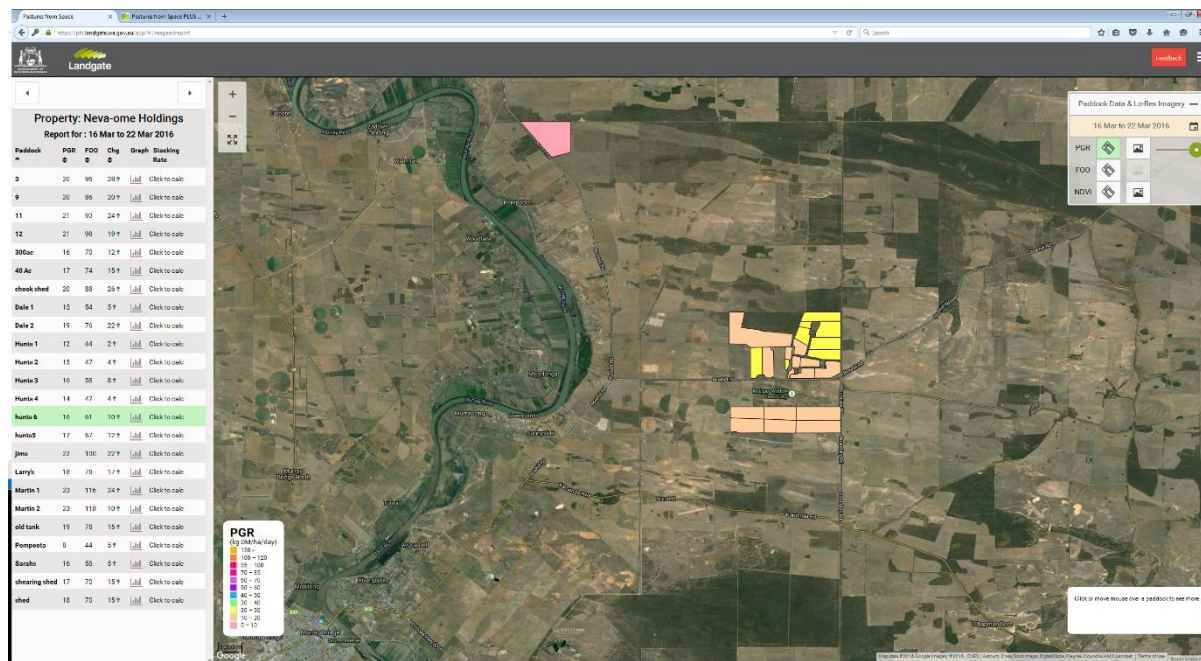
Figure 1 to 5 provide screenshots of the data from Pastures from Space for 'Nevaome'.

Figure 1 shows the paddocks for Nevaome entered into PFS. FOO and PGR data is also provided for each paddock (to the left of the screen) for the designated report period. Historical and current information is available using this screen.

Figure 2 shows the Pasture Growth Rate graph for a single paddock. Data is available for each paddock for the current year (2016) and for the previous 12 years. An average across all seasons is also provided. PGR is shown in kg DM/hectare/day.

On average PGR peaks at 20 kg DM/ha/day in September/October (see Figure 3) for Nevaome. Growth rates will govern the stocking rate capacity on individual paddocks.

Figure 1: Pastures from Space screenshot of 'Nevaome Holdings'



Pasture growth rate varies significantly across and within seasons. The relatively low annual rainfall, soil type, pasture composition and fertiliser history are the major limiting factors to higher pasture growth rates on this property.

Figure 4 provides the Feed on Offer (FOO) information, measured in kg DM/hectare for the '300ac' paddock. Average FOO for this paddock peaks at just over 600 kg DM/ha. This level is very low showing some serious limitations in some seasons for this paddock. FOO levels should ideally be above 800 kg DM/ha from a livestock feed and ground cover perspective.

Figure 5 represents the Total Dry Matter produced per hectare (kg DM/ha). This is one of the most important measurements; it represents the total amount of feed available for livestock and governs the total number of livestock that can be carried. Total dry matter produced for the growing season for the property ranged from 1316 kg (in 2006) to 5,236 kg DM/ha in 2010. Average TDM (across all years) was 2,843 kg DM/ha.

Data analysis

Total dry matter (TDM) production data was extrapolated from PFS graphs for all pasture paddocks across 'Nevaome' for the 10 year period 2005 to 2015. A simple spreadsheet was developed to assist in analysing the data – the key data included the week of break, growing season rainfall (GSR), total dry matter (TDM), water use efficiency (i.e. kg DM/mm GSR), potential stocking rate, potential total dry matter, unrealised TDM, and potential TDM/dry sheep equivalent (DSE).

Potential stocking rate (S/R) was calculated from TDM minus residue required at end of the season divided by 550 (the assumed kilograms DM consumed by a sheep). For 'Nevaome' a residual allowance of 800 kg DM/ha was allocated.

Potential TDM was calculated from GSR multiplied by 25 (the target kg DM/mm GSR). Brad Wooldridge uses a target of 30 kg, and has achieved 22 kg DM/ mm GSR.

Unrealised TDM is calculated from Potential TDM minus the actual TDM.

Figure 2: Pasture Growth Rate

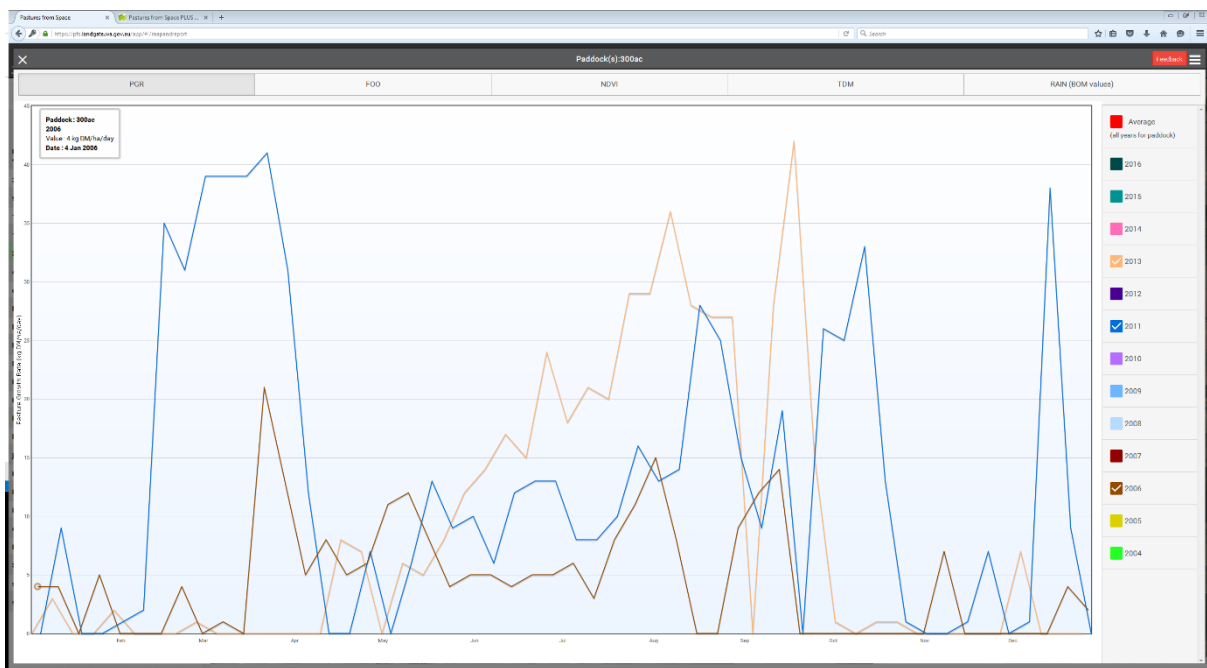


Figure 3: Average Pasture Growth Rate



Figure 4: Feed on Offer (FOO)

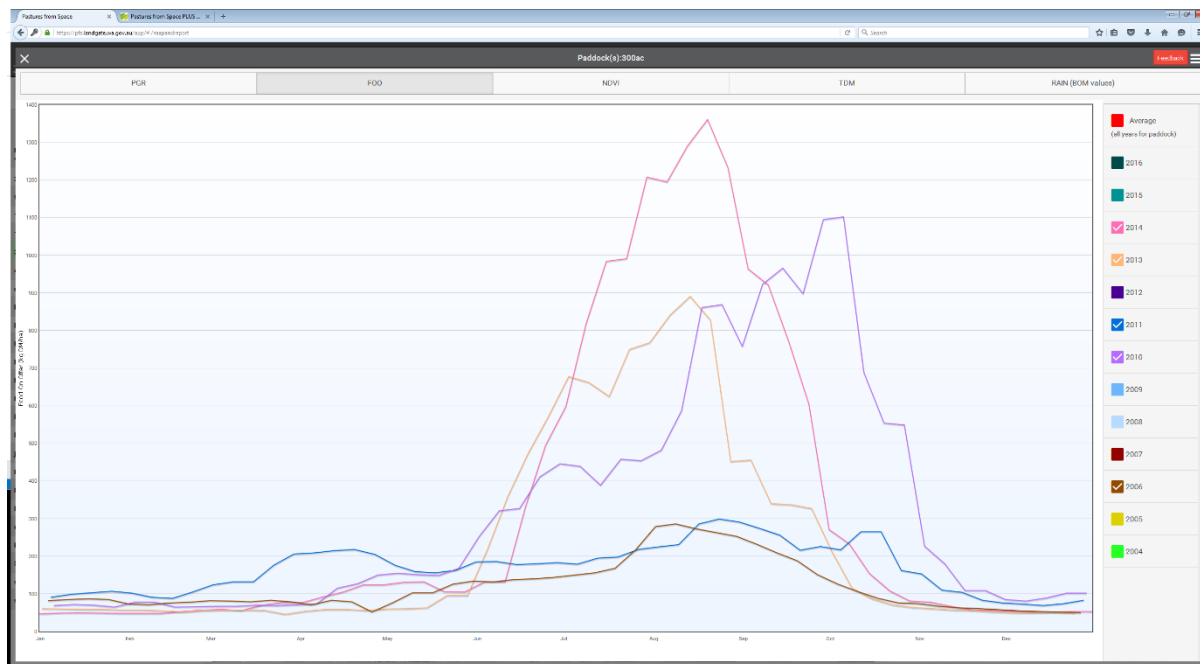


Figure 5: Total Dry matter (TDM)

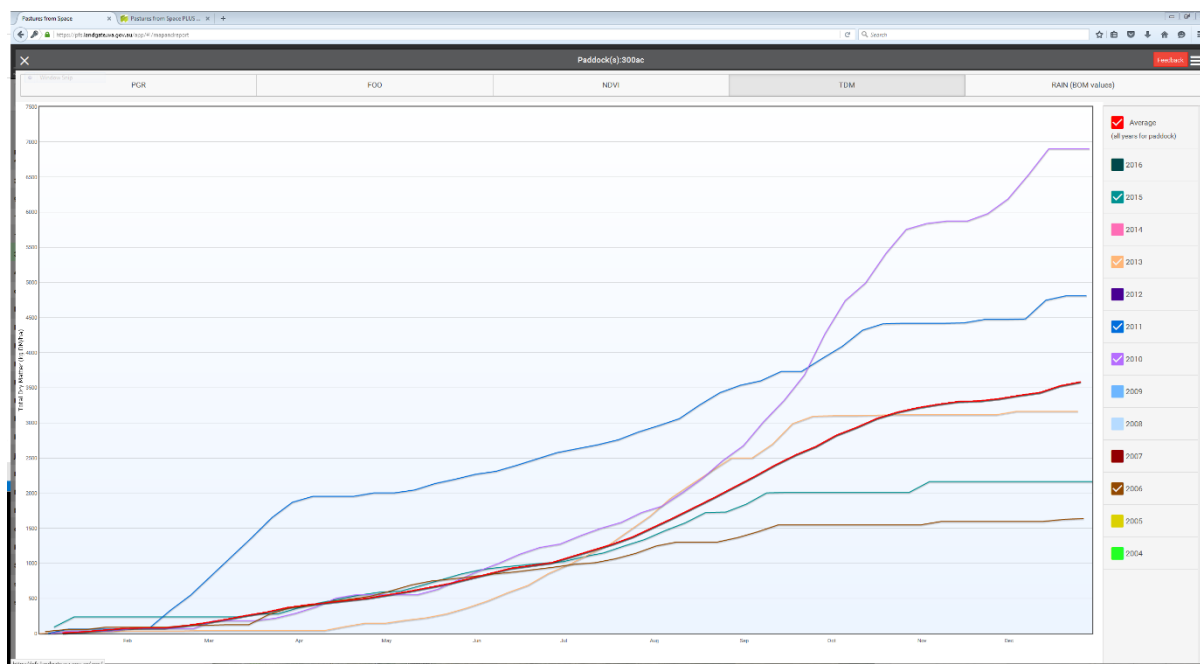


Figure 6 shows the water use efficiency for Nevaome for the 10 year period 2005 to 2015. A WUE of 14 was achieved in 2010 whilst in 2006 it was only 3 kg DM/mm GSR. The property is achieving an average of 7 Kg DM/mm GSR. With a potential target of 25 kg DM/mm GSR there is room for improvement.

Identifying the most limiting factors to achieving the target will be the next step. Aside from growing season rainfall other key factors may include pasture composition and density, soil types and soil nutrient and pH status (including fertiliser history).

Figure 6: Water use efficiency

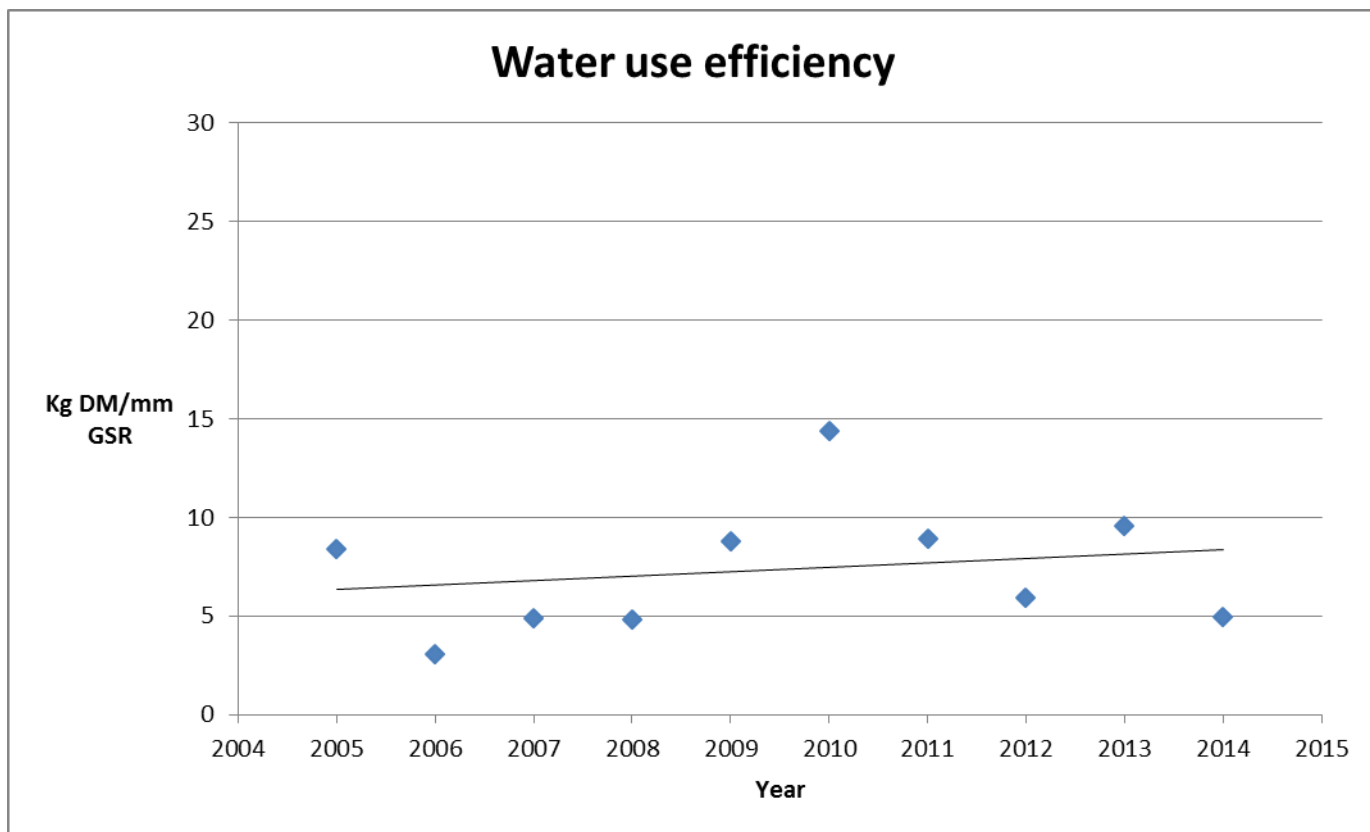


Figure 7: Potential Total Dry Matter

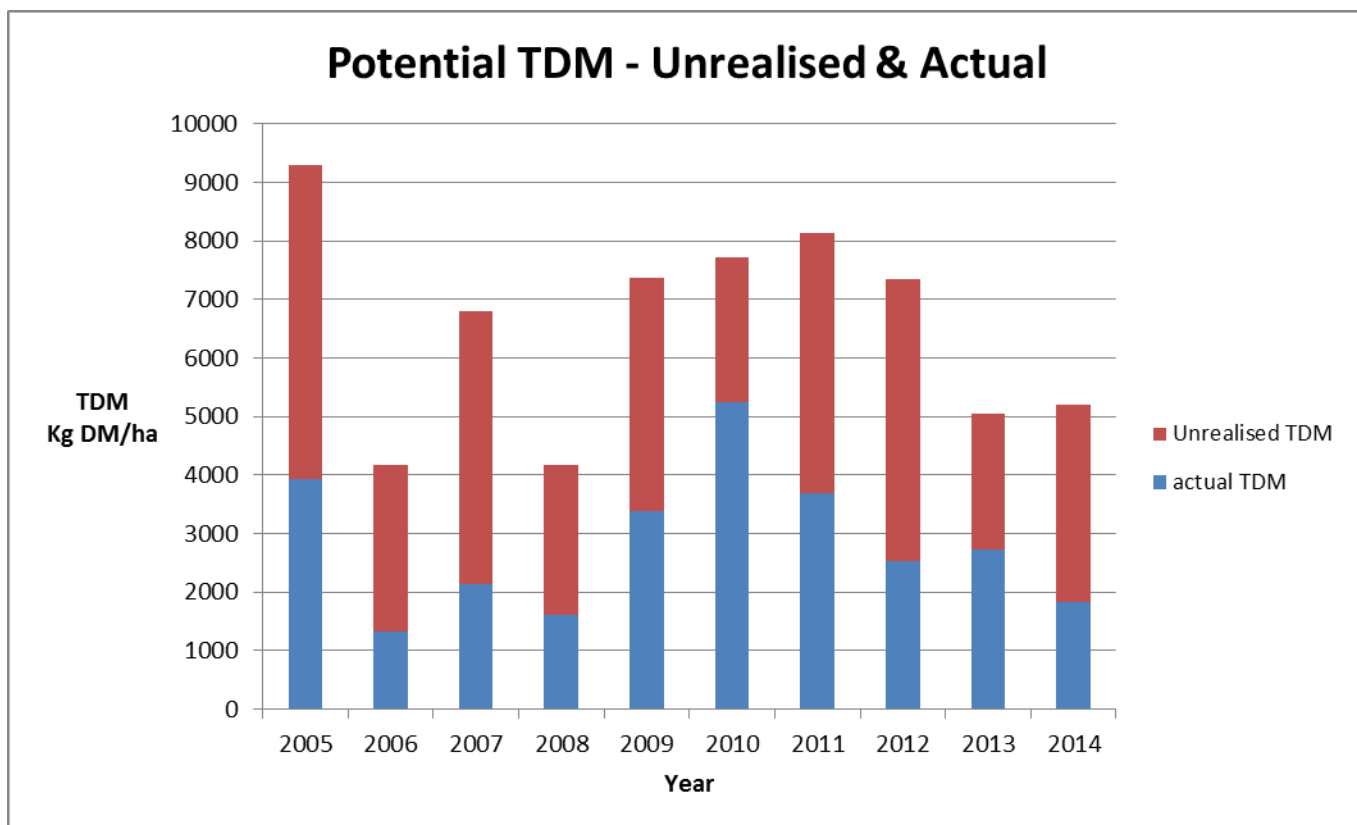


Figure 7 shows the unrealised TDM and actual TDM. On average 'Nevaome' is achieving 42% of the potential TDM, with a variation across seasons ranging from 31 to 68%.

Prior to 2010 'Nevaome' was on a minimal input system, with sheep allowed to graze across all paddocks and no fertiliser inputs. Since 2010 management strategies have been implemented to improve the productivity of the property. This should be reflected in improvements in WUE in the future. Growing season rainfall is probably the most limiting factor on productivity.

Limitations with Pastures from Space

Pastures from Space Plus was released in early March 2016 (this is the commercialised version of the program beta tested by the project). The major limitations with PFS for producers in the SA MDB region include:

- Satellite resolution
 - Currently data is received from the Modis satellite with 6.25 hectare pixels. This means that a pixel may cross paddock boundaries, and as such can give generic property data but may not be suitable for providing real time data at the paddock level. Obviously paddock size will also influence the suitability of the data.
 - PFS Plus also provides the option of receiving Landsat 8 satellite data at 900 m² pixels. However the satellite only flies over every 16 days. If there is any cloud cover during this time, no information is recorded. This was a serious limitation observed over winter on the collaborating properties.
- Ground truthing
 - PFS provides an indication of pasture production, however it has not been ground truthed for different pastures in the SAMDB region. In particular native pastures and Lucerne are two pastures that need to be checked. Anecdotal evidence from other regions suggest that native pasture measurements may be overestimated.
 - High resolution (Landsat 8) data is impacted by cloud cover – flying over every 16 days is a major limitation of getting paddock scale data.
- Data interpretation
 - PFS currently provides data and graphical displays, however it provides no interpretation or assistance with data interpretation.

Opportunities for other producers

By analysing the bigger picture farm system results using PFS data, the impact of the management on the productivity of the pasture system and its capacity to cope with seasonal variability and the effectiveness of strategies adopted over the past 10 years can be analysed.

Pastures from Space provides the opportunity to benchmark productivity and identify potential strategies to improve. It also provides information across a number of seasons that will assist in planning forthcoming years.