Precision Ag Trials

Chicken manure

Rankins Springs- CWFS

Although PA tools have been available to Australian grain growers for many years, and the benefits have been well documented, it is estimated that less than 1-% of grain growers utilise PA 'beyond guidance' in any form.

The objective of this GRDC / SPAA funded project is to increase the level of adoption of PA 'beyond guidance' by broadacre farmers. The project specifically aims to increase the level of adoption of variable rate (VR) by growers in the project to 30% by 2013. This goal will be achieved by demonstrating how to use PA tools to growers at a regional level and by increasing the skills of growers and industry in PA to a level where they can then use PA tools in their farming systems to achieve economic, environmental and social benefits.

Trials and demonstrations are conducted on growers' properties and are visited throughout the season using farm walks and workshops to discuss the advantages and disadvantages of PA techniques with the involvement of other regional growers.

This information sheet presents the outcomes of the SPAA trial **at CWFS Rankin Springs** from season 2011.

Aims:

To economically, increase cereal crop yields on poor performing sand rises incorporating Chicken manure at sowing in the in cropping paddocks.

Background:

Between Griffith and Hillston (NSW) there are large bands of cropping country which have sandy rises, of which, usually yield less than 1 ton per Ha, where the more productive areas of the paddock could be going 3 to 5 tons / HA. These poor yielding sandy rises can make up to 20 to 30 percent of a paddock.

If the yield of these areas can be increased to at least average then this will have considerably lifted the average yield of the whole paddock. However, it extra yield must be achieved in a profitable way.

During the 2010 season, soil pits were dug in the sandy rises. Ian Packer (Lachlan CMA) and Barry Haskins (NSW DPI), identified an acid band 15 to 20 cm down in the B horizon a few cm thick. This impeded root growth and no roots could be identified as passing through this band.

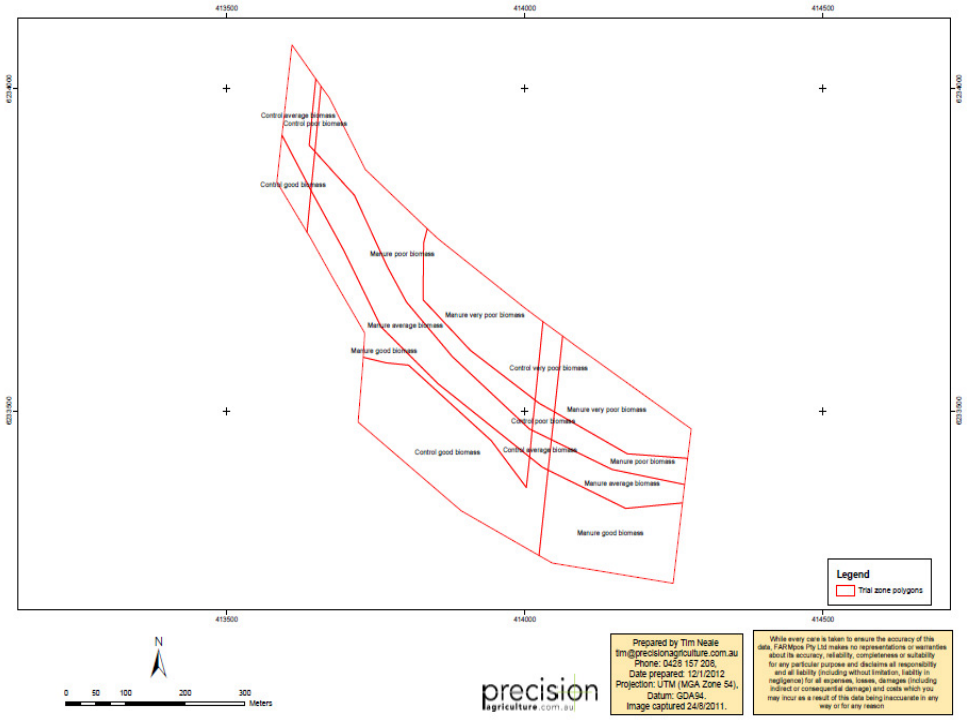
The 2010 trials were not conclusive enough since lime spreading was not targeted enough in one area. Hence, there was a (non statistical) significant response. In addition, the N rich strips gave a high response to crop biomass.

In 2011, Michael intended to undertake some targeted ripping and lime placement into this acid band. He also intended to continue monitoring with soil testing, NDVI (Normalised differential vegetation index) and yield maps as well as nitrogen rich strips through the sand rises at and following sowing. Chicken manure was to be applied in two different forms. After harvest, economic analysis will be undertaken to determine the profitable treatments.

About the 2011 trial Activity:

The trial location for 2011 was at Rankin Springs at 34^0 034942"S and 146^0 068477"E. The Paddock was sown to Schooner barley with a NDF disc planter and Flexicoil VR cart.

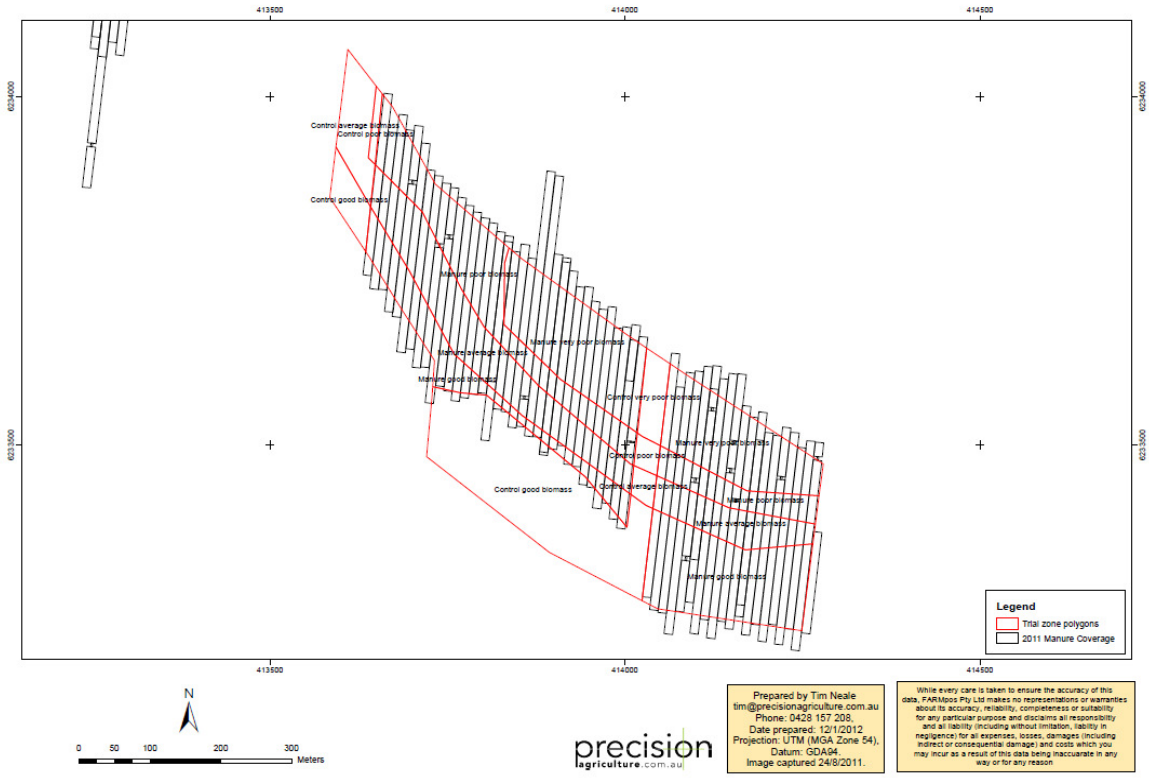
Sketch of trial design



The trial paddock was 280ha in size however; the trial treatments were only centred on sand rises within the paddock. The treatments included control, chicken manure at 2t/ha, Dynamic lifter (pelletised chicken Manure) at 200kg/ha, ripping and lime.
To break the acid band in the soil identified in 2010 deep ripping treatments with and without lime were included in the trial. Chicken manure and pelletised chicken manure in the form of Dynamic Lifter were spread evenly on the targeted sandy rise areas of the paddock. Satellite and Green seeker imageries were used to monitor and compare biomass to yield across the treatments.

The area marked by the rectangle strips in the diagram below shows all the area that received manure in one of the two forms in 2011.

The sketch of the trial design is clearly depicted by the diagram below, which shows the trial zone polygons and the 2011 manure coverage details.



Assessments:

The following assessments were undertaken in 2011 trials

- Plant counts
- Soil analysis
- Biomass (Greenseeker and Satellite imageries) presented as NDVI
- Crop yield

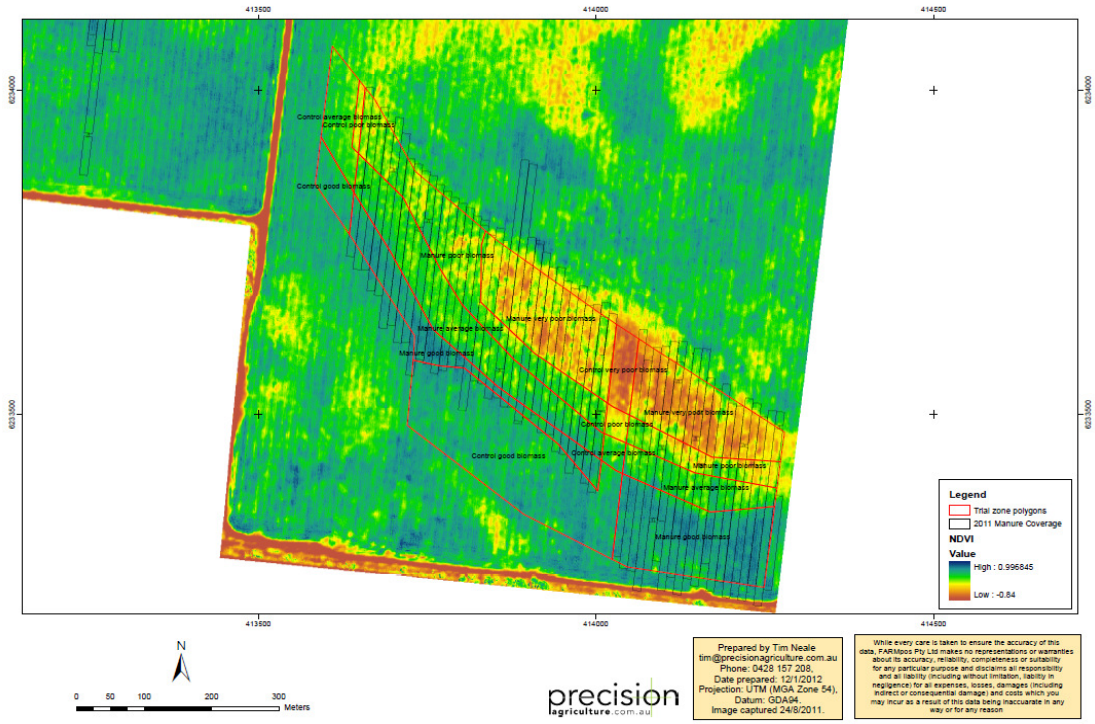
Results:

1. Soil analysis;

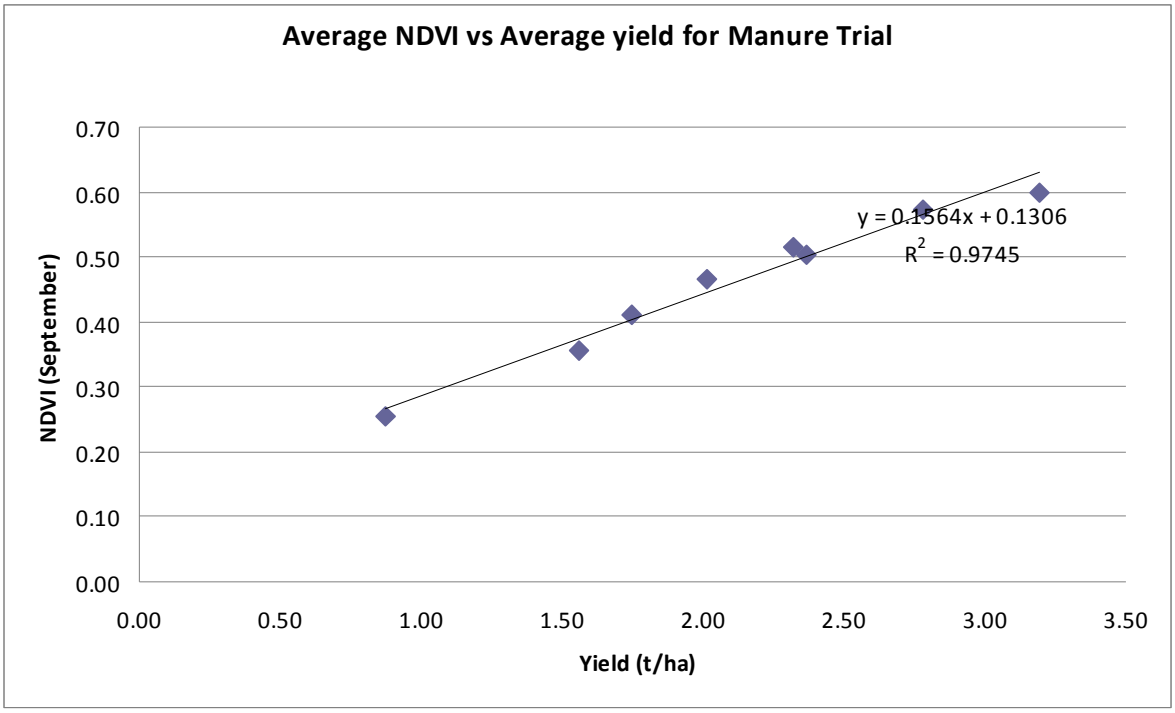
pH was 5.4 in the sand rises compared with 7.8 in the best parts of the paddock

2. Biomass yield;

a). The satellite image below shows the NDVI of the biomass on different trial treatments in 2011. As expected the sand rises had very low NDVI

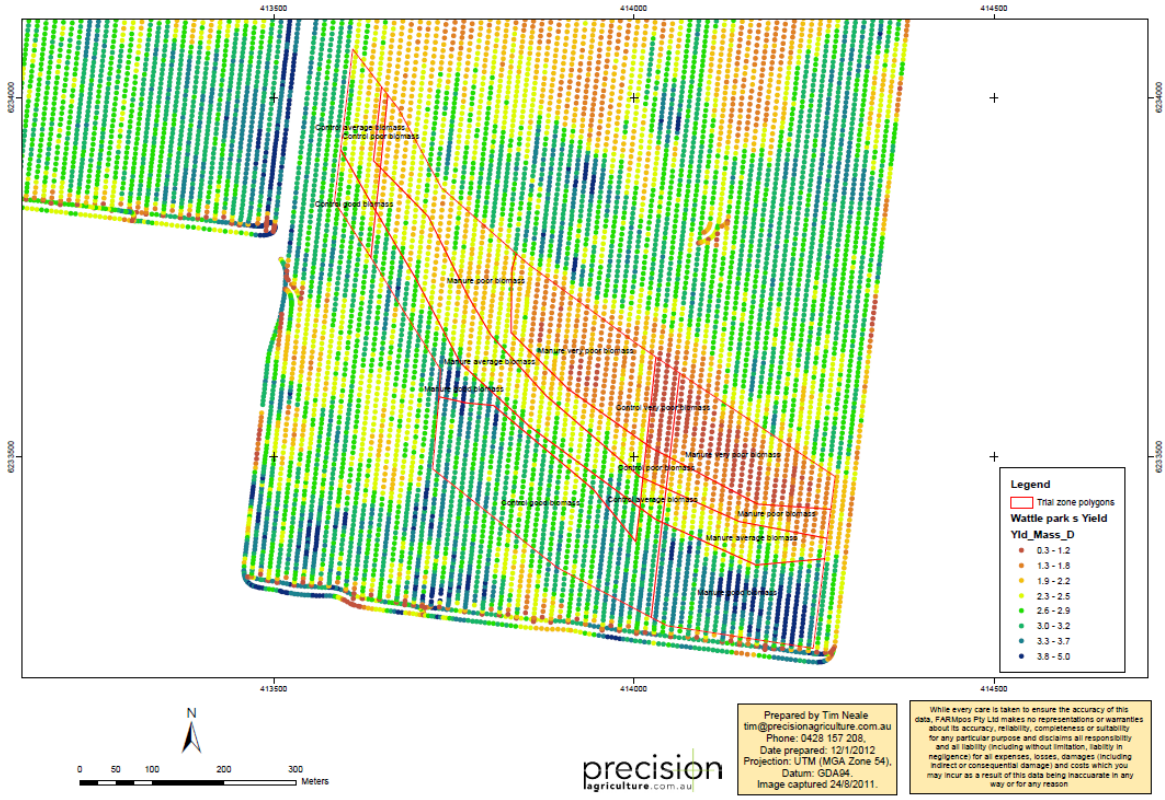


b). The graph below shows the relationship between biomass and cereal yield. The treatments with the highest biomass yielded the most. Previous research has found that the amount of biomass is directly related to the leaf index and photosynthetic activity of the plant and therefore crop yield.

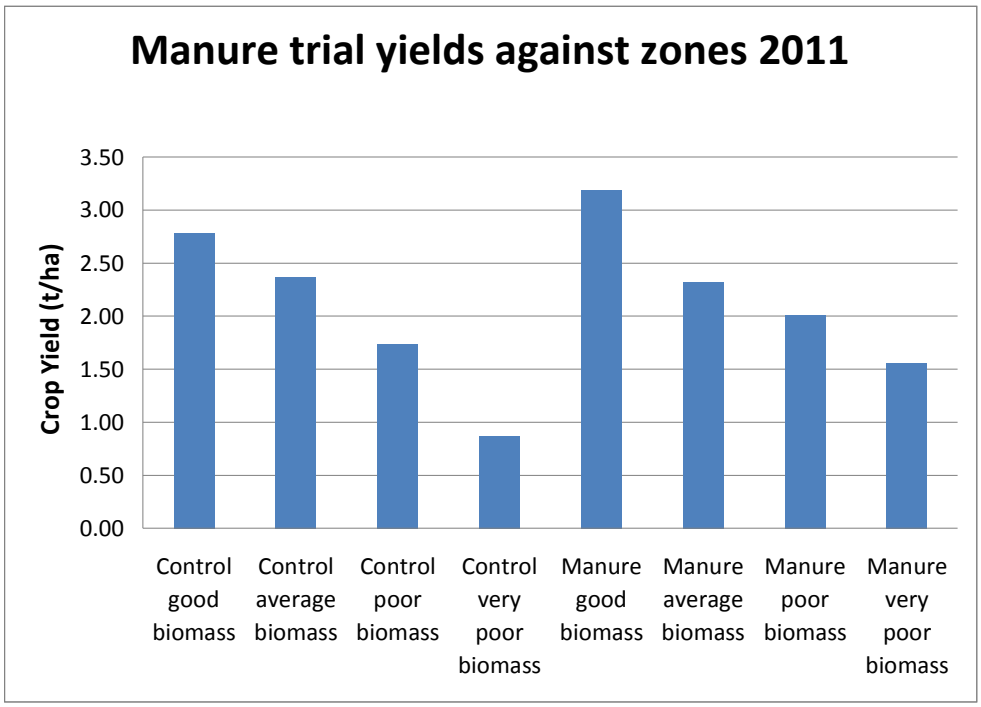


3. Cereal yield data

a). The yield map corresponds with the NDVI image

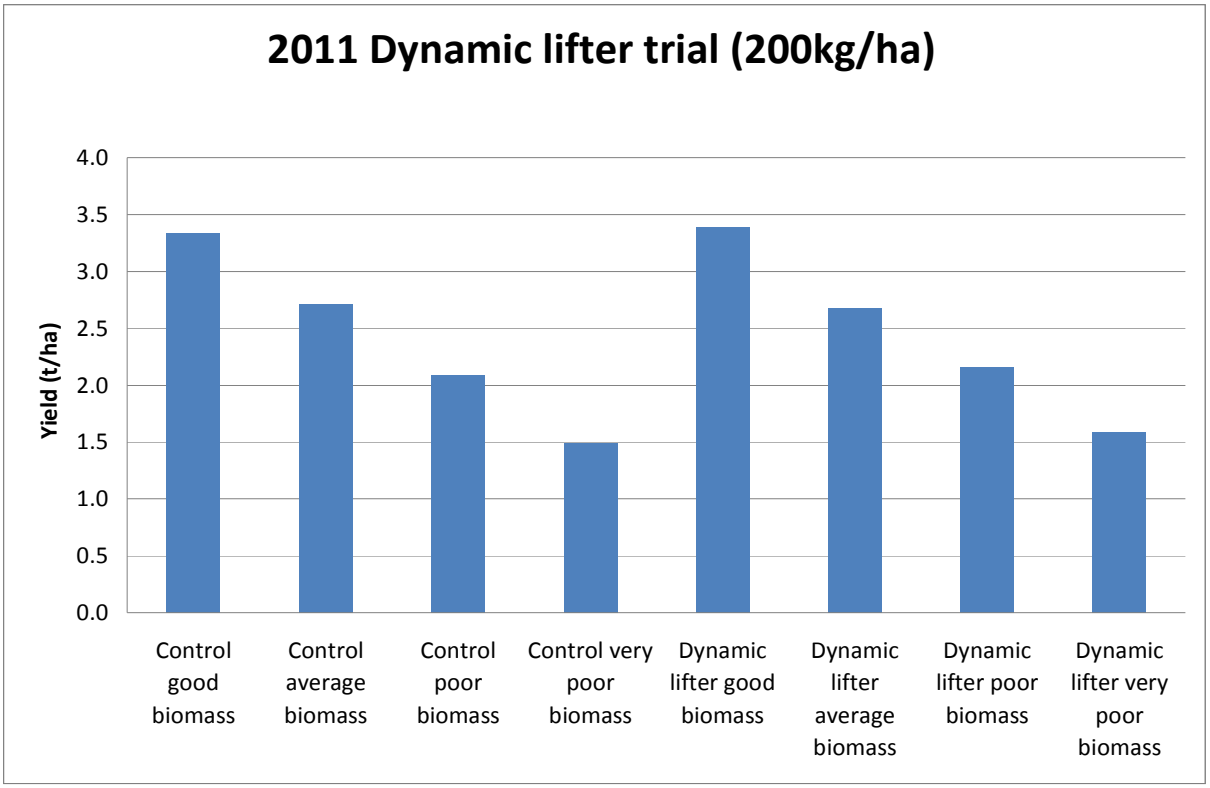


b). The graph below shows yield across trial zones and the table below shows the cost benefit analysis based on the grain price at the end of 2011 season. Despite poor biomass during the growing season, the crop on sandy rises had better gross margin most likely as a response to chicken manure application.

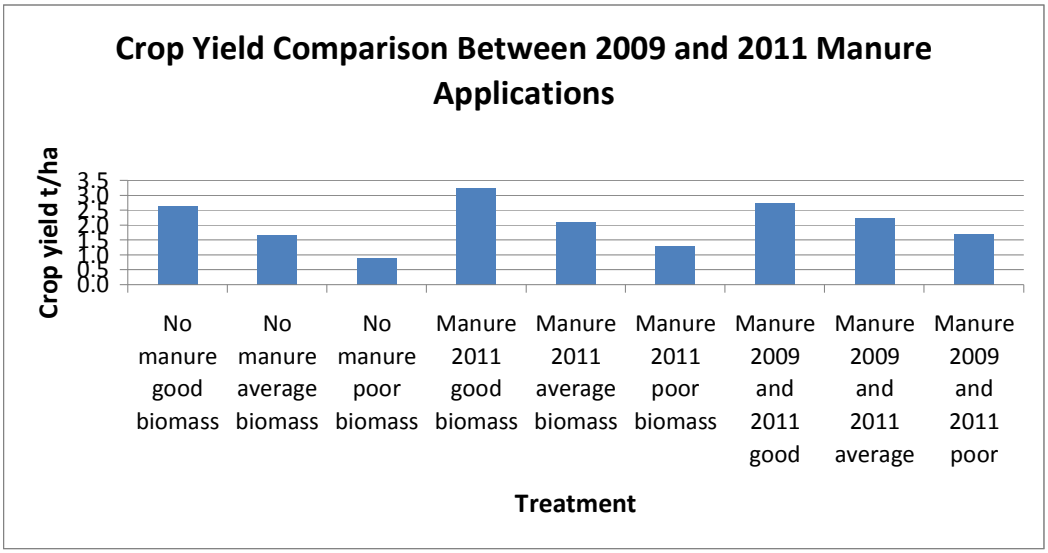


Treatment	Av of Av Yld	Av NDVI	Cost benefit analysis			
Control good biomass	2.78	0.57				
Control average biomass	2.37	0.50				
Control poor biomass	1.74	0.41	Differenc	Grain Price $/ton	Cost $/	Gain/los $/ha
Control very poor biomass	0.87	0.25				
Manure good biomass	3.19	0.60	0.41	160	80	-$ 14.2
Manure average biomass	2.32	0.51	-0.05	160	80	-$ 87.7
Manure poor biomass	2.01	0.47	0.27	160	80	-$ 37.3
Manure very poor biomass	1.56	0.36	0.69	160	80	$ 29.8

c). The graph below shows the grain yield from the Dynamic lifter trial treatments. There were no significant yield differences between the treatments and control. It is suggested that probably applying more dynamic lifter than used in these trials may more grain yield but economically at a loss.



d). The graph below shows the comparison in crop yield from different manure treatments in two years or one year as applied in 2009 and 2011. The table shows the cost benefit analysis based on the yield differences and the grain price at the end of 2011 season. The sand rises, which received chicken manure in 2009 and 2011, gave the highest gross margin. This suggests that there could be an economically profitable opportunity to apply chicken manure strategically in these sand rises every other year.



Treatments	Avg Yld	Av NDVI	differ	Cost Benefit Analysis		
No manure good biomass	2.6	0.5390		Grain price $/ton	Cost $/ha	Gain/Loss $/ha
No manure average biomass	1.7	0.4076				
No manure poor biomass	0.9	0.2590				
Manure 2011 good biomass	3.2	0.5927	0.6	160	80	$ 13.85
Manure 2011 average biomass	2.1	0.4816	0.4	160	80	-$ 8.23
Manure 2011 poor biomass	1.3	0.3189	0.4	160	80	-$ 15.39
Manure 2009 and 2011 good biomass	2.7	0.5668	0.1	160	80	-$ 64.84
Manure 2009 and 2011 average biomass	2.2	0.4939	0.6	160	80	$ 11.71
Manure 2009 and 2011 poor biomass	1.7	0.3727	0.8	160	80	$ 49.50

Who was involved

- Property owner Michael Pfitzner
- People and or businesses involved in data collection/ analysis/ services
  - Tim Neal Precision Ag etc
  - Trials coordinator Neil McMillan
  - CWFS contact James Mwendwa

Grower/Regional feedback

The trial went well in 2011 because the manure coverage was good. Michael was disappointed with the results from the deep rip treatments with or without lime, because there was no significant yield difference compared to the control and hence no economic gain.

However applying chicken manure at 2t/ha resulted in an increase in yield (especially from the most acidic sand rises) with a considerable economic gain/return. Therefore, as a result of these trials Michael is going to implement a strategic manure application programme with the objective of increasing his paddocks yield and profitability while reducing the impact of the sand rises.

Fellow growers in the area have embraced the trial outcomes and most of them are keen to adopt a similar strategy in their cropping system since chicken manure is widely available in the area.

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For more information

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