This project is supported by the Goulburn Broken Catchment Management Authority's Beyond SoilCare program through funding from the Australian Government.

Project:	**Greater than Gold – The search or better soil health in Graytown and Costerfield**
	Summary created August 2017
Location / address:	Costerfield, Victoria. GPS reference latitude 36'51'32, longitude 144'48'14
Organisation:	Graytown Costerfield Landcare Group
Contact person:	Carl Reeves (coordinator) or Alan Harris (Landholder)
Fund source:	Caring for our Country
Years of trial	2013 - 2016
Objectives of the demonstration	• The project aims to help local landholders develop further understanding of their soils through demonstration of soil ameliorants recommended by Gwyn Jones of Agrisolutions, and discussed at the Beyond SoilCare workshop. • The landholders goal for the site is to address the low pH and associated aluminum toxicity, improve productivity and to understand the implications of historical applications of superphosphate.
Basis of trial	• That demonstration of on-farm trials, with farmer to farmer discussion, enables the uptake of better land management practices. • That using lime will improve pH and Ca^{2+} availability. • That improving Ca^{2+} availability will improve plant ability to take up and transfer nutrients, therefore improving productivity. • That using compost with lime will increase the speed at which the lime reaction occurs. • The trial site it currently set stocked. • The use of pasture cages will be the first step in both assessing the impact of applied treatments but also demonstrating the benefits of pasture rest periods.
What was acchieved /soil treatments	The demonstration site is a 17Ha paddock, with an easterly aspect gently grading to a lower slope. Rainfall at the property is 525mm however, lower than average rain has fallen in recent years. The paddock has primarily been set stocked for the last 20 years. It has had single super applied at a rate of 150kg/Ha in 2012. There is no lime history. The pasture is an old perennial base of perennial rye and sub clover, which was sown down with a chisel plough and scarified 38 years ago (1974). Annuals such as Cape Weed, Silver Grass, Corkscrew, Soft Brome and Onion Grass are common. There is some Cocksfoot present. Stock management will not change. Pasture cages will be used to determine the impact of the demonstration treatments on pasture growth and composition. Treatments were applied in autumn/April 2013 and the trial ran for 3 years. Trial site 1 had Lime applied at a rate of 2500kg/Ha. Trial site 2 had lime applied at a rate of 1000kg/Ha. Trail site 3 had lime + compost –at a ratio of 50:50 of lime to compost @ 2500kg/Ha. Trial site 4 was the control site which had no change to management and no treatments. The trial design will be single truck applied strips approximately east west orientation, 10 meter wide plotted by GPS, with a 10 meter gap between them, this will mean that the actual test strip would be approximately 6 meter wide, grazing cages have been put out already to try and get information about what happens over summer with no grazing.

Measurements When/how/method

Given the change in land class and aspect, and therefore its impact on sheep grazing behavior, the site has been split into the upper and mid part of the paddock, excluding the lowest point. The 'High' and 'Mid' sites have a replicate of the demonstration on each site.

Two base line soil samples were taken at 20 meter intervals in a north south orientation, 1 strip for the high section and one for the mid section. Samples were submitted to FarmRight Technical Services and SWEP Analytical Laboratories. Samples were tested for standard fertility plus Total Calcium, Phosphorus and trace elements. Soil samples were taken each Spring for 2 year.

Water infiltration, worm numbers and penetrometer will also be used to monitor changes in soil condition. Pasture composition, dry matter and Brix will be measured monthly.

DSE (Dry sheep equivalent) will be recorded (set stocked so this is not expected to change).

Results

The first year results were highly in conclusion as there was little growth of pasture and associated biomass due to the dry conditions. The soils were so dry and hard that digging up the soil for biological audits was of limited value.

The success of the project was strongly influenced by the making and using of grazing cages, which were kangaroo proof. This gave the landholder and field day participants a clear visual illustration of both pasture biomass and biodiversity. During the first year there was very little growth in ayn of the trial sites.

During the second year, with increased rainfall, the treatment areas started to show improvement, which included increased clover content and increased pasture height. The pasture cages greatly assisted on verifying general pasture conditions. The comparative soil audit results were completed prior to the final field day and correlated with the on ground observations.

The outcomes concluded that, where the lime applications were used there was a higher overall increase in biomass and an improvement in plant succession. The increase in clover content in the first year continued into the second year. The same also applied to a decrease in the nitrate weed, Barley Grass. On the lime treated sites grasses had a darker green coloration and more uniformed growth. A causative effect was that where lime was applied the plants had not matured as quick, which gave a longer growing season. There was a strong correlation between increased root depth and improvement biomass. The deeper roots also contributed to the extension of the growing season. Although hard to scientifically validate – the surface soil was softer and appeared to hold more moisture and had increased organic matter decomposition. It was more "spongy" and smelt healthier.

The best outcomes were with the 2500kg/Ha of lime with compost, the next best results occurred in the 2500kg/Ha of lime trial and then the 1000kg/Ha of lime with the control giving the worse results.

After discussions it was considered by the group that the suitable rate would be a lower risk using 1000 – 600kg/ha of lime, in case some areas did not respond and by using the lower rate the farmer could hire a spreader rather than getting a truck to spread the lime which is more coste effective. The smaller spreader could access areas of the paddock a truck could not get to and a spreader would create less compaction on the paddock.

The results of the soil test indicated that calcium levels did rise.

Element	Control	1000kg/Ha Lime	2500Kg/Ha Lime	2500kg/Ha Lime + compost
Calcium	674	892	1262	926
Magnesium	290	336	331	355
Phosphorus	12	8	12	9
Potassium	290	242	280	220

The general increase in Phosphorus levels was of concern. One possible answer is that the 2500kg/Ha of lime and compost had higher iron levels (506 > 579). The opposite was for the

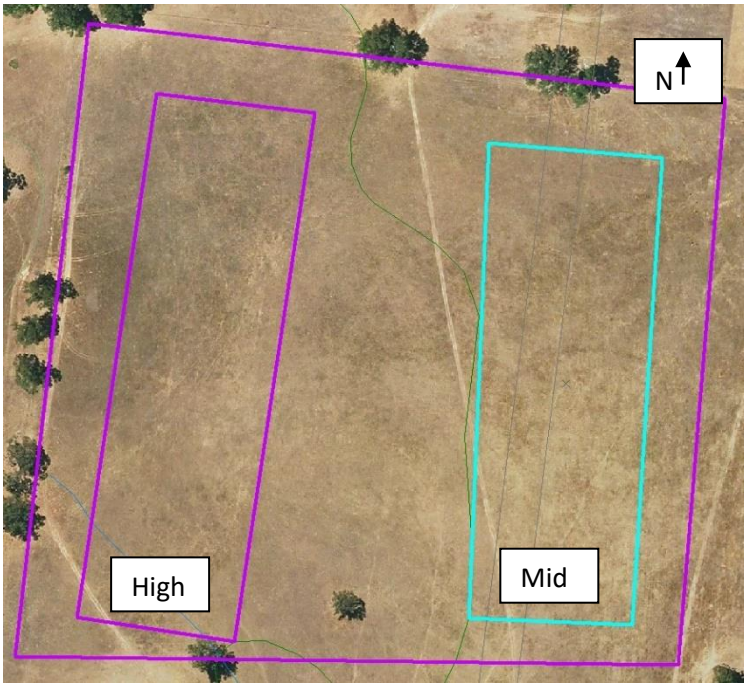
2500Kg/Ha of lime, were iron levels dropped (506>468) and Phosphorus levels remained the same.

In summary a positive response was achieved but the use of lime at varying rates. The addition of compost gave the best observable results. Phosphorus levels in general declined, but both growth and height increased. Land holders concluded and the results showed that the lime application gave a positive production outcome.

<u>Take home messages:</u>

- Lime works (best used at a rate of 600-1000kg/Ha).
- Lime can improve soil health.
- An increase in pasture and quality of pasture was produced with the application of lime.
- Using pasture cages helps to establish stocking rates and pasture growth.

Trial Plan



Mid

High