

## Soil Amelioration Focus Paddock

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**FOCUS Paddock**  
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### Focus Paddock Summary

With the commencement of the Optimising Irrigated Grains project Southern Growers formed Action Learning groups. These groups were created to follow the trials along and to identify knowledge gaps. This group looked at the proposed works to be trialed at the Finley Irrigation Research & Extension Site, through discussions they decided soil health was a common theme and that they would like to see strip trials of amendments in a paddock scale operation. They want to follow the Nitrogen level for multiple years.

The paddock has various amendments applied at depth, surface and incorporated, after visually not noticing any differences throughout the growing season in any year, soil tests were conducted to understand what was going on in the paddock. While the yield did not vary, the area that had Chicken Litter strip tilled was able to maintain a higher level of Nitrogen in the soil, this did not alter yield response though.

When choosing an area to ameliorate you need to be sure you are targeting low performing areas to see any financial return on the time and amendment costs. Some soils are achieving capacity through crop type, therefore focus on the areas within your farm that are under performing. While there was no significant results within the 3 years of this project it remains an area of interest for our growers and we would like to understand the impact of irrigation on the Nitrogen Banking in cropping season.

## Background and aims

With the establishment of Southern Growers Irrigation Discussion group we advised the members of the trials being planned for the Finley site with FAR & NSW DPI. We asked the group to put up their ideas of what we would like to test on a larger scale in their paddock. This discussion also took the growers on a journey of things they would like to try out that is potentially a little out of the ordinary. Through a facilitated discussion and priority setting session the group decided to try some Soil Amelioration work, looking at amendments potentially more available in our district and various methods of incorporating. The group highlighted soil as their number one priority and water security not far behind.

Farmer Jake offered to follow along with a paddock on his property and we agreed on amendments rates and techniques, we also committed to an infield crop walk to visually see difference mid cropping season. The group were all interested in seeing what Eshan was doing with the DPI trials at Finley and wanted to link their project back to his works.

Farmers normally apply their Nitrogen through “Bagged N” at sowing and in crop top dressing. Few farmers in the region look at chicken manure, however reliability and cost of freight are a limiting factor. The farmer will apply the strips of amendments and leave the rest of the paddock to district proactive of bagged N only. A small number of growers in the group use chicken manure and some also brown manure vetch for Nitrogen fixation.



## Methodology

**Site:** Blighty

**Irrigation:** Surface

**Crop:** Wheat

Apply various amendments at various rates with multiple methods to assess the effectiveness as an ameliorate and its impact over time on the Nitrogen within the soil. Apply the amendments in a 70 hectare paddock in 10m strips.

Apply amendments with spreader on surface, incorporate with strip till machine and apply with subsoil machine owned by Local Land Services, applying at depth.

Capture yield data and follow soil testing for life of project.

ZONE	AMENDMENT	RATE	METHOD
1	Cow Manure	10 ton	Surface Spread
2	Chook Manure	8 ton	Surface Spread
3	SSP	500kg	Strip Till
4	Chook Manure	15 ton	Sub Soil
5	Chook Manure	8 ton	Surface Spread
6	SSP	500kg	Strip Till
7	Cow Manure		Surface Spread
8	Chook Manure	8 ton	Surface Spread
	DAP	250kg	Strip Till
9	Cow Manure		Surface
	DAP	250kg	Strip Till
10	Cow Manure		Surface
11, 12, 13, 14	DAP	250kg	Strip Till



## Agronomic Results

Starting Paddock Nitrogen = 192.4kg

Table 2. Yield Results 2020 - Wheat

ZONE	AMENDMENT	RAW DATA	Yield
1	Cow Manure, 10t, Surface	4899	9.798 t/ha
2	Chook Manure, 8t, Surface	4812	9.624 t/ha
3	SSP, 500kg, Strip Till	4893	9.786 t/ha
4	Chook Manure, 15t, Sub	4726	9.452 t/ha
5	Chook Manure, 8t, Surface	4826	9.652 t/ha
6	SSP, 500kg, Strip Till	4795	9.590 t/ha
7	Cow Manure, 20cu/ha, Surface	4774	9.548 t/ha
8	Chook Manure, 8t, Surface	4794	9.588 t/ha
	DAP, 250kg, Strip Till		
9	Cow Manure, 20cu/ha, Surface	4843	9.686 t/ha
	DAP, 250kg, Strip Till		
10	Cow Manure, 20cu/ha, Surface	4855	9.710 t/ha
Control	No treatment		9.642 t/ha

## Yield Results 2021 – Wheat – Paddock average 9.99t/ha

Due to lack of variance in 2020 results the grower watched the yield monitor in header and did not note any large differences to record.

## Yield Results 2022 – Faba Bean – Paddock Average 1.9t/ha

2022 was an extremely high-pressure year for disease in Faba Beans due to the wet nature of the season.

The yield variances compared to amendments applied at various rates and incorporation level was insignificant.

The soil tests showed that the high yielding crop was pulling the Nitrogen level down and the area with Chicken Litter Strip Till did in fact hold the Nitrogen level higher



Soil Test Results – Deep N Only

YEAR	Control	CL Banded	CL Banded Int	CL Surface
2020	192.4kg			
2021	158.96kg	166.7kg	194.58kg	183.8kg
2022	123.04kg	131.84kg		



# Key learnings and recommendations

As the group looked at the results each year, they drew conclusions that they would put into practice on their own farms.



## Paddock Selection

In selecting a paddock conducting soil tests is vital, don't look at your existing high performing areas and try increase yield potential, more so focus on lower performing areas and bring up the potential yield capacity.

A consistent close to 10t/ha wheat crop is a regionally accepted as a high yielding crop and potentially the peak. In hindsight we would have picked an area consistently achieving 7t/ha and tried to bring the soils up to a similar level as the paddock selected. Sodic Soils



When looking at paddock selection for amelioration focus on a highly sodic paddock or areas with topsoil or subsoil constraints

## Zones

Choose areas within a paddock to treat with amendments rather than a blanket approach.

## Costs

The time investment alone with applying amendments at depth with the likes of the subsoil machine is substantial. The process was tedious and timely and did not return the results we had hoped. Amelioration is expensive and a solid return on investment needs to be assured before undertaking big areas.

Apal  Compost Test Report 

Sample received 4/17/2020  
Sample reported 4/24/2020

Analyte	Units	Compost		Application rate (kg/ha)	Applied kg nutrient/ha
		Oven-dry basis	As-received basis	1000	
Total Nitrogen	%w/w	1.94	1.71	enter application rate in cell above	17.1
Aluminium	%w/w	2.46	2.17		21.7
Boron	mg/kg	32	28		0.028
Calcium	%w/w	0.92	0.82		8.2
Cobalt	mg/kg	7.91	7.0		0.007
Copper	mg/kg	29	26		0.026
Iron	%w/w	1.23	1.09		10.9
Magnesium	%w/w	0.72	0.64		6.4
Manganese	mg/kg	382	337		0.337
Molybdenum	mg/kg	<2	0.9		0.001
Phosphorus	%w/w	0.42	0.37		3.7
Potassium	%w/w	1.77	1.56		15.6
Sodium	%w/w	0.35	0.30		3.0
Sulphur	%w/w	0.31	0.27	2.7	
Zinc	mg/kg	90	79	0.079	
Moisture Content	%w/w	11.8			

total nitrogen determined by Dumas high temperature combustion  
 nutrients determined by oxidising acid digest with ICP-OES finish  
 chloride determined by potentiometric methods (if applicable)

## Amendment Selection

The grower was an ex dairy farmer and had a stockpile of cow manure and while he didn't think this was the best product to use he was interested to see if he would see a yield response.

Chicken Litter has been part of the growers practice for several years applied surface only in the past. They decided to vary rates and the incorporation technique to see if there was a greater yield response. The manure lab test is attached for reference.

## Growing Season Comments

Jake commented that the subsoil amelioration process whilst difficult was done effectively. He used resources easily available to him with cow manure on farm, and their common practice was to apply chicken manure when available.

Using the specialised machine created numerous problems and was slow with material blocks occurring regularly, in reflection he would focus on low yielding areas and apply amendments only in those areas to see if he could lift the soil profile to level out the yield.

In all year's post amendment application Jake was unable to visually see any differences in the growing season. He thinks that this is attributed to rotation starting with faba beans and the high starting deep n status of the soil. This high nitrogen status was able to be carried forward through the following 2 wheat crops with the appropriate paddock fertilizer program targeting high irrigated yields and masked any effects the treatments had on the crops.

## Group Comments

Growers were initially interested in looking at this work that was in line with the greater project to see how they can improve their soil quality. They all feel there needs to be an easier way to apply amendments at depth that is cost effective. Until proven results can be seen in large scale operations the adoption of this work is likely to be quiet low. The results at the central site in Finley also didn't yield results strong enough for growers to adapt at this stage. It remains an area of interest worth of exploration.

## Acknowledgements

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