



State NRM - Barossa Sustainable Soils Focus Paddocks



Project Overview:

- NRM Community Grant funding
 - Sustainable agriculture focus
- The Barossa and Mid North Dairy Discussion Group (20 members)
- Identified that improving the health of their soils is critical in ensuring the long-term productivity and sustainability of their enterprises.

AIMS:

1. Improve the *capacity of landholders* to manage their soils and pastures sustainably.
2. Improve *land condition for primary production* by maintaining and improving the health of the soil.
3. Increase the *number of producers* participating in natural resource management activities to improve land management practices.

BACKGROUND:

- 2011 Dairy SA project: soil testing and associated management plans local producers
- 6 paddocks identified across the region and developed into Focus Paddocks over 12 month period to build on this knowledge
- Key issues identified to look at across these paddocks include:
 - Developing a nutrient balance audit
 - Interaction between soil and pasture quality/ quantity
 - Soil microbial activity
 - Effect on ground cover and dry matter production
 - Utilising effluent and its effect on the soil health and carbon farming

Achieved by:

- Soil and pasture management plans developed to improve the health of the soil to improve the productive capacity and sustainability of the enterprise.
- 4 Producers: Koch, Seeligers, Steinerts, Klemms





Collaboration and Funding

Others engaged to provide agronomic, soil science and pasture nutrition advice:

- Tim Prance (Develop Case Studies)
- Chris Madigan (NRM funding)
- DairySA (2011 Soil Test Results)
- Farmer Johns
- Truro Agencies
- Rural Solutions SA

CASE STUDY: Ben and Murray Klemm

The role of effluent management in improving soil health



Aim:

Determine the effect of long term effluent spreading on soil health and subsequent pasture production.

BACKGROUND

- 2 effluent dams collect dairy water and solids
- Effluent water sprayed annually using a 20,000 gallon tanker in March across 98Ha area (cropping and pasture)
- A total of 1.6 million gallons/ year are spread or 74,000 L/ha/year
- Solids are kept on site until they are dry and then sold, *effluent water is seen as a 'bonus' and does not take the place of fertiliser*
- This has been occurring for the past 10 years
- ***The effluent water has never been tested or effect of the effluent on the soil determined***

TREATMENT PADDOCKS:

- 4 paddocks within pasture system receive the effluent;
 - 3 Perennial ryegrass & over-sown with annuals (increase dry matter through winter and spring)
 - 1 Unimproved- barley grass & clover (Plans to divide this into smaller paddocks and improve with perennial pasture)
- Cropping paddocks to the east also receive the effluent
- Effluent application restricted by distance of paddocks

EFFLUENT RESULTS:

Water Quality		YOUR RESULT	Recommended upper limit	Unit
Acidity or Alkalinity	pH	7	6 - 7.4	N/A
Electrical Conductivity -	EC	6.51	0.65	dS/m
Sodium Absorption Ratio -	SAR	6.3	3	meq/L
Chloride -	Cl	571	200	ppm
Hardness (Calcite)	Hardness	1000.7	100	ppm
Total Dissolved Salts -	TDS	4166.4	420	ppm
Sodium -	Na	458.2	74	ppm
Calcium -	Ca	209.3	100	ppm
Magnesium -	Mg	116.1	100	ppm
Potassium -	K	419.7	15	ppm
Phosphorus -	P	70.82	0.2	ppm
Nitrate -	NO3	378.5	10	ppm
Ammonium -	NH4	41.8	not available	ppm
Zinc -	Zn	0.67	2	ppm
Boron -	B	0.66	0.2	ppm
Sulphur -	S	318.44	25	ppm
Copper -	Cu	0.1	0.2	ppm
Iron -	Fe	4.51	1	ppm
Manganese -	Mn	1.45	0.2	ppm
Molybdenum -	Mo	0.003	0.01	ppm
Total Dissolved Ions -	TDI	2298.193181	400	ppm

• Cl, Na and TDS elevated

• K, P and NO3 high

IMPLICATIONS:

- Any application of this effluent will increase the salinity and sodicity of the soil
 - Consider the soil type before applying soil ameliorants
- Most Potassium will be available, however easily leached as most potassium is utilised by the plants in Spring
- Nitrogen availability is the same due to losses and plant availability at the time of spreading.

OUTCOMES:

- *All soil test showed no detrimental effect on soil over time*
- Soil results indicate application rates not high enough to impact soil composition
- Spring application more beneficial to plant growth

POND COMPONENT	N (%)	P (%)	K (%)
Effluent	50-60 (70)	60-80	> 90 (100)
Sludge	20-30 (10)	20-30 (5)	< 10 (100)
Losses	10-30 ^a	<10 ^b	—
Note: ^a Volatilisation losses ^b Precipitation losses			

The fate of nutrients in ponds, and the percentage of these nutrients available for plant uptake (shown in brackets). Source: Fyfe, 2013

FUTURE APPLICATIONS:

- Opportunity to maximise Potassium in effluent
 - Apply in spring when most beneficial to plant
- Alternative application methods & timing
 - Spray methods & application rate?
 - Paddock allocation?
 - Discussion with Farmer Johns
- Opportunity to utilise solid waste



Producer Case study:

ANDREW KOCH

Glenunga Props, Moculta



Property Background:

- 323 ha dryland farming
- 525 mm rainfall
- Herd size & type: 200 milkers, 200 heifers
- Milk production 1.4 Million L/year
- Year round calving with the majority in Jan/Feb and July/Aug
- Also run Holstein & Jersey Stud
- 200 Ewes
- Labour (inc family and employees as applicable)
- Family run; Andrew, Angela & children
- 3rd Generation Family farm

Aim:

- Develop a cost effective management plan to improve the health of the soil and production of pasture



Paddock Background:

- Purchased in 08/09 - continuously grazed prior to purchase
- 240 acres (98 Ha) for entire section
- Dam paddock, 5ha in size
- Grazed through summer
 - January to break in season- using ewes and dry heifers and grazed with 140 ewes (till April when they are moved home for lambing), 10 heifers, and 10 bulls (until may)
 - DSE of 5 DSE/Ha across the whole section.
- Remainder of the year can be grazed occasionally with sheep during winter.

Trial Aim:

To prevent further erosion and to improve the productivity of the paddock

1. Cost effective management plan to improve soil health and therefore pasture production.
2. Establish perennial pasture to further stabilise the paddock
3. Manage and improve the large area of erosion on the northern side of the paddock.

Highlighted Issues:

- Pasture typical of a local hills grazing paddock
 - Very few soil amendments
 - Previously cropped and also overgrazed
 - Pasture consist of broadleaf weeds, Guildford grass and some annual grasses
- Minimal ground cover over summer
 - Large areas of bare ground containing very little organic matter
 - Further risk of erosion
- Large erosion area on northern end- dispersive clay & steel rubbish from previous owner



1. Improve pasture species to improve production

- Rotational grazing system (5 paddocks) with the sheep
 - To ensure persistence of perennial species, ensure ground cover, organic matter and soil health.
- Perennial pasture will reduce the rate of acidification of the soil.



June 2013



Pasture Sown 2013

2. Manage large erosion area

- Dam area fenced off using NRM Board funding
 - Trough & solar pump to provide water for livestock
- Erosion gully area
 - Remove steel debris?
 - Fence off gully
 - Establish perennial pasture (slow water/improve ground cover in summer)
 - Aim: 70% + ground cover all the time over 80% of paddock.
- Challenge to improve erosion area and return to productive use.....





Management Plan:

- October 2012: Spray topping annual grass & establish perennial phalaris/ocksfoot pasture (Acid tolerant phalaris: Advanced AT)
- Summer 2012: Explore options for fencing, troughs etc with NRM Board
- May 2013: Complete knockdown (remove any competition to the new pasture)
- Early June 2013: Topdressed with 2t/Ha lime
- Mid June 2013: Sow perennial pasture
 - FJ450 Blend + 5kg/ha cavalier medic (Recommended by Peter Wendt)
- Sept 2013: Explore options/alternative methods & create management plan for erosion area
- Nov 2013: Trench digging & laying of water delivery pipe to tank



Future plans:

- Involve BIGG and dairy discussion group
- Pasture walks/field day on outcome of management plan for erosion area
- Manage pasture with rotational grazing and best farming practice