Healthy Soils Healthy Food

Field day

28th September 2012

Property of Paul Fleming, Broadford

Supported by

LANDCARE SOUTH WEST GOULBURN LANDCARE NETWORK

GOULBURN BROKEN CATCHMENT MANAGEMENT AUTHORITY

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State Government Victoria Department of Primary Industries

Background

As caretakers of the land we all want to leave our farms in a better state than when we first arrived. The challenge is to do this in a cost effective and sustainable way.

Under the guidance of Brenton Byerlee, of Soil Management Systems, we will be making strategic applications of gypsum and foliar sprays to unlock available nutrients already within the soil and to encourage microbial soil activity.

During the next three years we will monitor;

- Nutrient levels within the soil
- Nutrient levels within the plant tissue
- Pasture growth rates
- Stocking rates
- Animal productivity measured in kilograms of beef per hectare

During this trial we will be following two properties in the Broadford area.

Both properties utilize a grazing management system known as cell grazing. Cell grazing improves farm productivity by maximizing pasture growth, maintaining pasture quality and regulating the even distribution of animal nutrients across the cells. (Refer to the attachments for more information.) These properties currently produce 236kg beef/ha.

The first is known as **Zwar's;**

- It consists of 64 hectares of black volcanic soil. Most of the property is flat.
- The average rainfall is 700mm
- The pasture is a base of Australian Phalaris, native grasses and self-sown annual and perennial ryes.
- The 64 ha is divided into 23 cells
- Currently run 43 autumn calving cows and calves (March)
- The calves are weaned in January and sold in February
- **The aim is to lift the stocking rate to 48 cows and carry them with ease**

The second property is **Healy's ;**

- It consists 150 hectares of undulating ironstone country
- The average rainfall is 700mm
- The pasture is a base of Australian Phalaris, native grasses and self-sown annual and perennial ryes
- The 150 ha is divided into 25 cells
- Currently running 71 autumn calving cows and calves (March) and 45 joined heifers.
- The calves are weaned in January and sold in February
- The aim is to maintain the stocking rate of 100 1st and 2nd calving cows but to no longer rely on supplementary feed.

Treatments applied

Lime at 3 t/ha was applied to all cells in 2011

In 2012 treatments to Zwar's on cells 1,2,8,9,10,11,16,17,22,23 were

2012	**Treatment Costs**	**Cost/ha**
Gypsum 2t/ha	$49/t + $17/t	$132
Nutri-soil 5ltr/ha	$25/ha + $10/ha	$35
SMS TE Mix 2ltr/ha (Mn 4% ,Zn3%, Cu2%, Bo 0.5%, Mo 0.1% Co 0.1%)	$25/ha	$12
Total Cost		**$4,868.80**

The same treatments were applied to Healey's

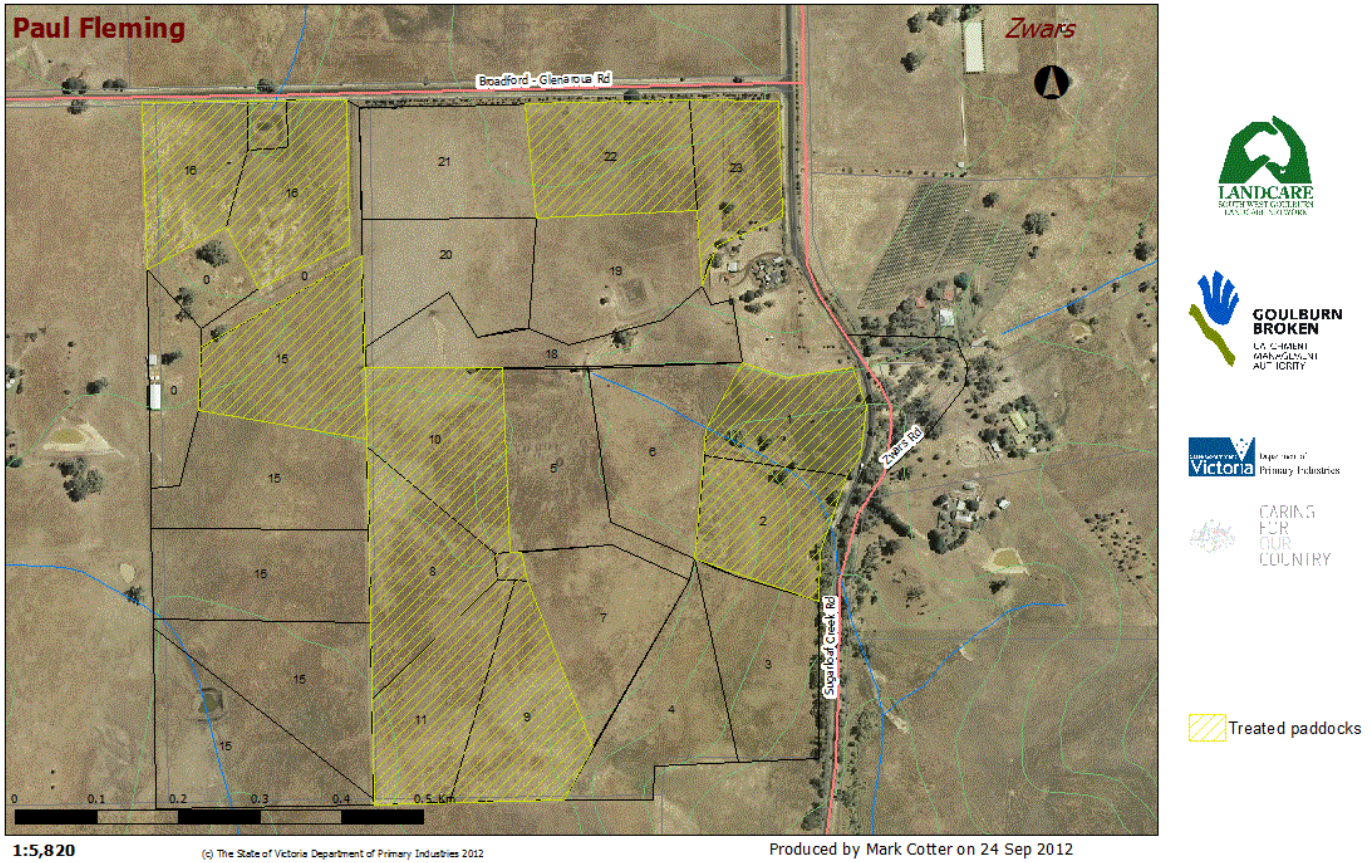

Figure 1. Layout of cells on Zwar's. Treated cells are shown as hatched

Summary of soil test results

Zwar

Deficient | Slightly Low | Excess

						ANIONS							
SAMPLE ID		**LAB #**	TEC	ORGANIC MATTER	PH H2O	N	S	TOTAL P	P OLSEN	DGT Phosph	Phosph Bray 2	P DEFICIT	P RECOVERY
				%		kg/ha	ppm	ppm	ppm	ppm	kg/ha	kg/ha	%
DESIRED			12-25	4-6	6-6.5				18-28		126		100
4577 Zwar 1 & 2	Treated	D105	24.68	6.7	5.68	109	41	1041	5	33	69	57	46
4604 Zwar 6	Un-treated	D102	21.63	6.5	5.95	108	25	959	3	29	74	52	36.67
4605 Zwar 22 & 23	Treated	D103	35.01	6.8	5.44	109	44	581	5	l/S	45	113	40
4606 Zwar 20 & 21	Un-treated	D104	38.34	8.4	5.65	117	22	745	6	l/S	57	101	42

			CATIONS				TRACE ELEMENTS						
SAMPLE ID		**LAB #**	Ca	Mg	K	Na	Co	B	Fe	Mn	Cu	Zn	Mo
			kg/ha	kg/ha	kg/ha	kg/ha	ppm	ppm	ppm	ppm	ppm	ppm	ppm
DESIRED							> 1.5	> 0.8	100-400	80-140	> 2	> 8	0.8 - 1.2
4577 Zwar 1 & 2	Treated	D105	4985	1504	319	164	1.75	0.46	178.1	75.91	1.47	2.85	1.79
4604 Zwar 6	Untreated	D102	4831	1620	287	103	1.81	0.38	227	72.7	1.28	2.22	1.62
4605 Zwar 22 & 23	Treated	D103	5746	2145	247	138	3.34	0.41	617.3	73.04	1.21	1.82	1.46
4606 Zwar 20 & 21	Untreated	D104	6835	2714	235	130	3.1	0.45	560.7	91.66	1.24	2.7	1.4

					BASE SATURATION %							
SAMPLE ID		**LAB #**	CHLORIDES	SALINITY	Ca:Mg RATIO	Ca	Mg	K	Na	Other Bases	Exch Hydrogen	S
			mg/kg	EC 1:5		%	%	%	%	%	%H	mg/kg
DESIRED			< 200	< 2	5.67	68	12	3.1	1.5	3.4	12	8
4577 Zwar 1 & 2	Treated	D105	30	0.08	2.01	44.9	22.3	1.5	1.3	6	24	6
4604 Zwar 6	Untreated	D102	10	0.04	1.81	49.6	27.4	1.5	0.9	5.6	15	
4605 Zwar 22 & 23	Treated	D103	50	0.09	1.62	36.5	22.5	0.8	0.8	6.4	33	11
4606 Zwar 20 & 21	Untreated	D104	20	0.05	1.53	39.6	25.9	0.7	0.7	6.1	27	

Summary of plant tissue test results

PLANT ANALYSIS SUMMARY - Zwar Sept 2012

Deficient | Slightly Low | Excess

Sample ID			Crop	N %	Nitrate	Crude protein %	S %	P %	K %	Mg %	Ca %
			Pasture	**4.8**	n/a	**29.7**	**0.38**	**0.42**	**3.5**	**0.24**	**0.9**
2365 Zwar 1 & 2	Treated	PT023	Pasture	2.7	0.01	16.9	0.37	0.36	2.02	0.27	0.58
2366 Zwar 6	Untreated	PT024	Pasture	2.96	0.01	18.5	0.23	0.29	1.64	0.26	0.5
2364 Zwar 22 & 23	Treated	PT022	Pasture	3.11	0.01	19.4	0.35	0.34	1.98	0.25	0.64
2370 Zwar 20 & 21	Untreated	PT010	Pasture	3.86	0.01	24.1	0.21	0.39	2.18	0.24	0.48

PLANT ANALYSIS SUMMARY - Zwar Sept 2012 (cont'd)

Sample ID			Crop	Na %	Cl %	Fe ppm	Al ppm	Mn ppm	B ppm	Cu ppm	Zn ppm
			Pasture	**0.2**	**1.3**	**213**	**43.8**	**123**	**14.3**	**11.3**	**45**
2365 Zwar 1 & 2	Treated	PT023	Pasture	0.12	0.7	957	586	121.5	6.6	7	26.9
2366 Zwar 6	Un-treated	PT024	Pasture	0.21	0.7	441	280	140.9	6	5.8	21.1
2364 Zwar 22 & 23	Treated	PT022	Pasture	0.18	0.78	740	548	232.7	6.8	6	24.9
2370 Zwar 20 & 21	Un-treated	PT010	Pasture	0.16	1.24	456	279	156.9	4.6	5.9	17.3

PLANT ANALYSIS SUMMARY - Zwar Sept 2012 (cont'd)

Sample ID			Crop	Co ppm	Mo ppm	Ca/P Ratio Index	Cation Index	Cation: Anion Index	Grass Tetany Index
			Pasture	**0.1**	**1.6**	**n/a**	n/a	**n/a**	**n/a**
2365 Zwar 1 & 2	Treated	PT023	Pasture	0.78	0.5	1.6	0.4	140	1
2366 Zwar 6	Untreated	PT024	Pasture	0.34	0.4	1.7	0.4	170	0.9
2364 Zwar 22 & 23	Treated	PT022	Pasture	1.22	0.2	1.9	0.4	149	1
2370 Zwar 20 & 21	Untreated	PT010	Pasture	0.61	0.5	1.2	0.3	147	1.3

Healy **SOIL AUDIT SUMMARY Sept 2012**

Deficient | Slightly Low | Excess

						ANIONS							
SAMPLE ID		LAB #	TEC	ORGANIC MATTER	PH H2O	N	S	TOTAL P	P OLSEN	DGT Phosph	Phosph Bray 2	P DEFICIT	P RECOVERY
				%		kg/ha	ppm	ppm	ppm	ppm	kg/ha	kg/ha	%
DESIRED			12-25	4-6	6-6.5				18-28		126		100
4583 2,4 & 5 west	treated	D098	7.8	4.21	6.06	93	18	221	10	20	134	0	73.33
4585 22 & 19	treated	D101	4.77	2.79	5.35	79	33	166	10	14	95	22	70
4584 5 east	untreated	D099	7.73	4.78	5.82	99	18	212	7	14	100	17	76

			CATIONS				TRACE ELEMENTS						
SAMPLE ID		LAB #	Ca	Mg	K	Na	Co	B	Fe	Mn	Cu	Zn	Mo
			kg/ha	kg/ha	kg/ha	kg/ha	ppm	ppm	ppm	ppm	ppm	ppm	ppm
DESIRED							> 1.5	> 0.8	100-400	80-140	> 2	> 8	0.8 - 1.2
4583 2,4 & 5	treated	D098	2213	278	243	64	0.25	0.22	799.6	31.6	0.34	1.3	0.77

west										7			
4585 22 & 19	treated	D101	862	196	103	64	0.3	0.23	1036	14.11	0.27	1.31	0.59
4584 5 east	untreated	D099	1832	307	257	88	0.41	0.22	675.4	31.45	0.43	1.21	1.1

					BASE SATURATION %						
SAMPLE ID		**LAB #**	CHLORIDES	SALINITY	Ca:Mg RATIO	Ca	Mg	K	Na	Other Bases	Xch Hydrogen
			mg/kg	EC 1:5		%	%	%	%	%	%H
DESIRED			< 200	< 2	5.67	68	12	3.1	1.5	3.4	12
4583 2,4 & 5 west	treated	D098	10	0.05	4.85	63	13	3.6	1.6	5.3	13.5
4585 22 & 19	treated	D101	10	0.05	2.66	40.2	15.1	2.5	2.6	6.6	33
4584 5 east	untreated	D099	10	0.05	3.61	52.7	14.6	3.8	2.2	5.7	21

PLANT ANALYSIS SUMMARY - Healy Sept 2012

Deficient

Slightly Low

Excess

Sample ID			**Crop**	**N %**	**Nitrate**	**Crude protein %**	**S %**	**P %**	**K %**	**Mg %**	**Ca %**

			Pasture	**4.8**	n/a	**29.7**	**0.38**	**0.42**	**3.5**	**0.24**	**0.9**
2367 2,4 & 5 west	treated	PT025	Pasture	3.94	0.01	24.6	0.36	0.49	3.74	0.23	0.49
4585 22 & 19	treated	PT009	Pasture	3.21	0.01	20.1	0.27	0.39	2.8	0.19	0.43
4584 5 east	untreated	PT008	Pasture	3.95	0.01	24.7	0.2	0.37	2.84	0.22	0.46

Sample ID			**Crop**	**Na %**	**Cl %**	**Fe ppm**	**Al ppm**	**Mn ppm**	**B ppm**	**Cu ppm**	**Zn ppm**	**Co ppm**	**Mo ppm**
			Pasture	**0.2**	**1.3**	**213**	**43.8**	**123**	**14.3**	**11.3**	**45**	**0.1**	**1.6**
2367 2,4 & 5 west	treated	PT025	Pasture	0.15	1.52	290	187	119.1	9	5.7	24.2	0.17	1.2
4585 22 & 19	treated	PT009	Pasture	0.2	0.95	329	305	174.4	5.5	6.6	26	0.24	0.6
4584 5 east	untreated	PT008	Pasture	0.2	0.91	261	171	87.6	8.4	6	21.6	0.3	1.3

Grazing days Zwars

Table 1 Grazing days in treated cells

Treated Cells	Ha	Grazing Days				
Cell No		Aug	Sept	Oct	Nov	Dec
1	2.3					
2	2.3					
8	2.7					
9	2.7	5				
10	2.8	5				
11	2.6	2				
16	4.1	2				
17	3.1	1				
22	2.8	2				
23	1.8	2				
	27.2 ha					

Table 2 Grazing days in untreated cells

Untreated cells	Ha	Grazing Days				
		Aug	Sept	Oct	Nov	Dec
3	2.7					
4	2.7					
5	2.9					
6	2.9	1				
7	2.6	2				
12	3	1				
13	3	2				
14	3					
15	3.1	3				
18	2.5	2				
19	2.8	1				
20	2.7	2				
21	2.9	2				
	36.8 ha					

Table 3 Pasture Growth Rates in kg DM/day in 2012

	Aug	Sept	Oct	Nov	Dec	Jan
Treated	14.1					
Untreated	13.4					

Grazing days Healys

71 Cows and calves

45 Heifers

Treated Cells	Ha	Grazing Days				
		Aug	Sept	Oct	Nov	Dec
Cell No 2	4.86					
3	2.56	3				
4	8.57					
5 west	3.7	1				
16 west	3.59	1.5				
18	6.35	8				
19	7.8	13				
20	6.4	8				
21	5.6	4				
22	5.87	6				
	55.3 ha					

Untreated cells	Ha	Grazing Days				
		Aug	Sept	Oct	Nov	Dec
Cell No 1	5.83					
5 centre & 5 east	6.48	1				
6	10.75	3				
7	9.37	3				
8	8	5				
9	7.17	2				
10	7.22	2				
11	4.67	2				
12	9.29	3				
13	4.83	3				
14	5.32	3				
15	5.64					
16 east	3	1.5				
17	3					
	94.88					

	ha					

Pasture Growth Rates in Kilograms of Dry Matter 2012					
	Aug	Sept	Oct	Nov	Dec
Treated	14.4				
Untreated	14.7				

Cell Grazing

A successful farming enterprise is constantly searching for improved productivity. Paul established a "Cell Grazing" management system to better manage his pastures and his livestock.

Cell grazing uses what is known about pasture regeneration to maximize pasture growth rates. In summary, when pasture reaches the 3 leaf stage (for rye) or the 4 leaf stage (for phalaris) the plant's energy reserves in the roots are fully replenished. If the plant is grazed in this phase of its growth it will be able to regenerate new leaves in the shortest time allowed for, by the conditions (ie moisture, temperature, daylight etc). New growth begins 3 days after initial grazing, so to maximize pasture growth rates, stock should not graze in a cell for more than 3 days. With this in mind, cells should be sized according to the number of stock you are running.

Cell grazing achieves a number of things,

- Greater pasture productivity – you will grow more grass.
- By maximizing pasture growth rates you can increase your carrying capacity.
- Manure is more evenly distributed across each cell
- Better able to match pasture to stock requirements.
- Not allowing animals to selectively graze will improve the quality, composition and persistence of your pasture.
- In a cell grazing system weeds are often controlled if not eradicated.