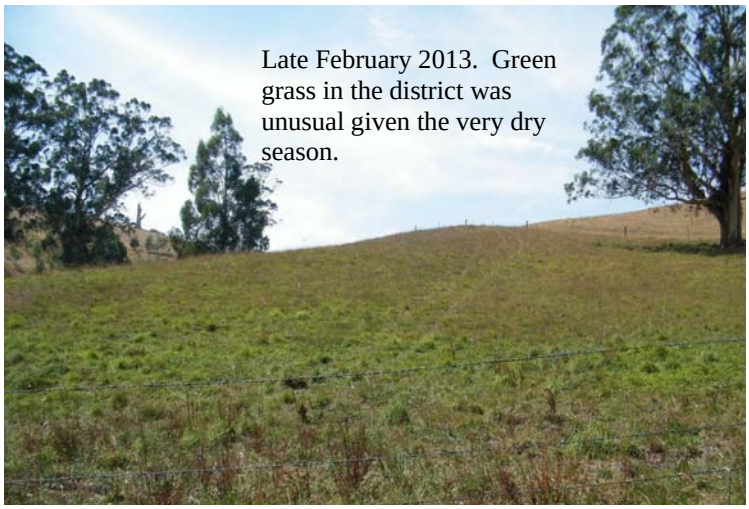
South Gippsland Landcare Network
PO Box 419 Leongatha Vic 3953
Phone: (03) 5662 5759
Fax: (03) 5662 5569
Email: sgln@landcare.net
Web: www.sgln.org.au

Case Study: Extended grazing and soil health Arawata

The Property

The farm was purchased by the current owners in December 2001. The 65 hectare property is undulating to steep and has approx 1.2kms of the Wilkur Creek flowing through the centre. The property is used for grazing.
When the owners purchased the property the creek was unfenced and weed infested. The focus of the first few years of work on the property was weeds, fencing then restoring the creek and establishing off waterway watering points for stock.
The property is grazed by approx 60 head of cows and calves. The areas used for grazing (approx 50 Ha) is divided into 15 paddocks, by permanent fencing and hot wires further dividing the area into grazing cells .
Water is provided to the cells by portable water troughs which are plumbed into hydrants located across the property.
Mean annual rainfall is 1083 mm; mean annual temperature is 13.5 deg C and the soil is a clay loam.

This property was chosen for a case study as a demonstration of how extended or cell grazing can aid in the retention of nutrients on a farm. With no additional inputs over more than 10 years of grazing, the levels of P, K, N and carbon (organic matter) are still adequate.



Late February 2013. Green grass in the district was unusual given the very dry season.

Grazing Philosophy

The owners are reluctant to use any inputs on the grazing areas. Soil tests have determined that in fact nutrient levels are mostly adequate, with the calcium and copper being a little on the low side. Copper is being supplemented to the livestock by lick blocks. Calcium (lime) is being considered for future application.
By using small cells on a long rotation—extended grazing, the cattle are forced to eat all the pasture they are allocated for the one or two days which stops animal eating out the preferred pasture species and leaving the less palatable. This has several desirable effects.

1. The long rotation allow plants such as clover set seed. Clovers are important in this system for their nitrogen fixing ability.
2. Litter build up maintains soil cover and nutrient for soil biology. Roots can penetrate deeper accessing more nutrient.
3. It is possible to have deep rooted perennial grasses such as cocksfoot as part as the pasture mix. In a traditional grazing rotation the cattle would preferentially eat the most palatable species such as clover and ryegrass leaving the cocksfoot to go rank and un-nutritious. In this system all plants are eaten equally (this is called the herd effect –animals in a herd eat all they can quickly so as other herd mates cannot beat them to it)
4. Urine and manure are evenly spread over the smaller area and the action of animal hooves pushes open plant crowns and helps incorporate the material into the upper layers of the soil. This is the main mechanism for nutrient retention on the property. Cell grazing avoids high nutrient “stock camps” that often concentrates nutrients under trees and next to waterways.

This case study is part of the South Gippsland Landcare Network’s Healthy Soils Project which is funded through the West Gippsland CMA project “Healthy Soils Sustainable Farms: building carbon and managing pH in West Gippsland”

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Soil Test Results

YEAR	2013	2010	2002
Laboratory	CSBP	SWEP	Farmright
Ammonium Nitrogen mg/Kg	46	n/a	n/a
Nitrate Nitrogen mg/Kg	13	7*	n/a
Phosphorus Colwell mg/Kg	26	25.1	36
Potassium Colwell mg/Kg	432	293	522
Sulphur mg/Kg	11.9	1.1	16.9
Organic Carbon %	4.06	2.7	5.06
Conductivity dS/m	0.111	0.066	0.16
pH Level (CaCl2) pH	4.8	5	4.6
pH Level (H2O) pH	5.7	5.6	5.4
DTPA Copper mg/Kg	0.60	4	n/a
DTPA Iron mg/Kg	183.93	384	3067 #
DTPA Manganese mg/Kg	66.16	116	n/a
DTPA Zinc mg/Kg	1.78	3.6	n/a
Exc. Aluminium meq/100g	0.259	n/a	0.69
Exc. Calcium meq/100g	6.19	6.08	6.95
Exc. Magnesium meq/100g	2.55	2.71	2.68
Exc. Potassium meq/100g	1.02	0.73	1.28
Exc. Sodium meq/100g	0.20	0.41	0.30
Boron Hot CaCl2 mg/Kg	0.61	0.3 #	n/a
Total Nitrogen %	0.46	n/a	n/a
Cation Exchange capacity-meq/100g	9.6	24.5	11.9
Calcium Magnesium ratio	4.0	2.24	2.6
*SWEP test is for Available nitrogen			
# method unknown			

These soil tests are from different laboratories and so comparisons are sometimes difficult as methodologies are different. However we can see that pH is slowly increasing, and the most other parameters are the same, with most levels being fine for a grazing system. Not fertilizing is not having a negative impact with nutrients being recycled and returned to the pastures. Nitrogen, carbon and sulphur are increasing, and potassium is fluctuating but still ok.

The cattle leave an even spread of nutrients during grazing.

The plants are grazed down to an even level, with no preferential grazing. Plants are not grazed past the point where recovery is compromised.

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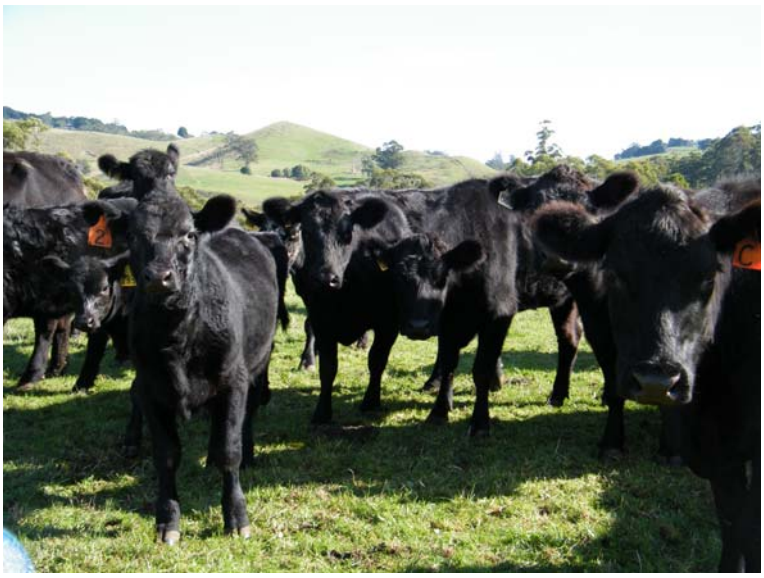
Soil Structure

The soil shows no 'crusting' with the surface friable and open. The plants have deep roots and are well able to recover from intensive grazing. The herd's hoof action works the manure and urine into the top few centimetres of the soil, lays down litter and opens up clumping grass plants. When rain falls it is able to penetrate completely. The soil carbon levels are maintained by the mulching of plant litter.

This area of soil shows the friable porous texture. This is a unusual area of the paddock as the pasture is managed to avoid loss of plant cover. The 'hoof plough' effect opens up clumping grasses and encourages spreading,



The cattle are very quiet due to daily handling.

What's different about this system?

There are many different names for grazing systems including the Hoilistic planned, Savory method, cell grazing, controlled grazing, management intensive grazing (MIG), planned grazing or ultra-high density grazing.

The main difference with extended grazing is the length of rotation allowing for litter build up , followed by a short, intensive grazing.

The farm is divided up into many small paddocks (or as in this case, a number of paddocks divided by electric fencing into smaller 'cells') Moves are based on the growth rate of the pasture and the plants requirement for rest and regrowth. The cell size is determined so the herd grazes the pasture down to a desirable level in one to two days. The plants are protected as they are not grazed until they have recovered.

The cattle are going from the area on the left to the paddock on the right. (again notice the even spread of manure on the left hand side).

Even though the paddock looks in the top photo to be quite dry, there is a lot of green pick available, including clover (late Feb 2013). The clover has flowered and set seed. This year was particularly dry and graziers faced many challenges to keep good feed ahead of their livestock.

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Plant health

The pasture plants are a good mix of species including ryegrass, clover, cocksfoot and plantain. The deep roots of the cocksfoot open the soil up to a greater depth than the ryegrass allowing moisture penetration. The clover fixes nitrogen in the soil, and the plantain has a tap root which opens the soil and allow the utilization of minerals deep in the soil.
The extended grazing system allows the plants to recover from grazing and the nutrients available from the dung and urine allow them to do so.

Same two paddocks (different camera angle) show pasture recovery over the 12 weeks since grazing took place. There has been approx 100 ml of rain during this time, which is well less than the expected average.

Above: From the upper photo to the lower in 24 hours.

Key findings from this case study

- By grazing stock at a high density for a short period nutrients in the urine and manure are retained in the pasture.
- Long recovery period protects and enhances soil structure and moisture levels.
- Soil health is maintained by the action of animal hooves, breaking up clumping plants and laying plant wastes on the surface of the soil. he soil surface is kept open.
- Losses of nutrients in the system into areas such as stock camps and laneways are reduced. If the extended grazing system was used on a property that has fertilisers applied, production would increase but nutrient loss would still be minimised, and therefore input costs would be lower.

The landholder subject of this case study requested that their name be withheld from publication for privacy reasons.

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