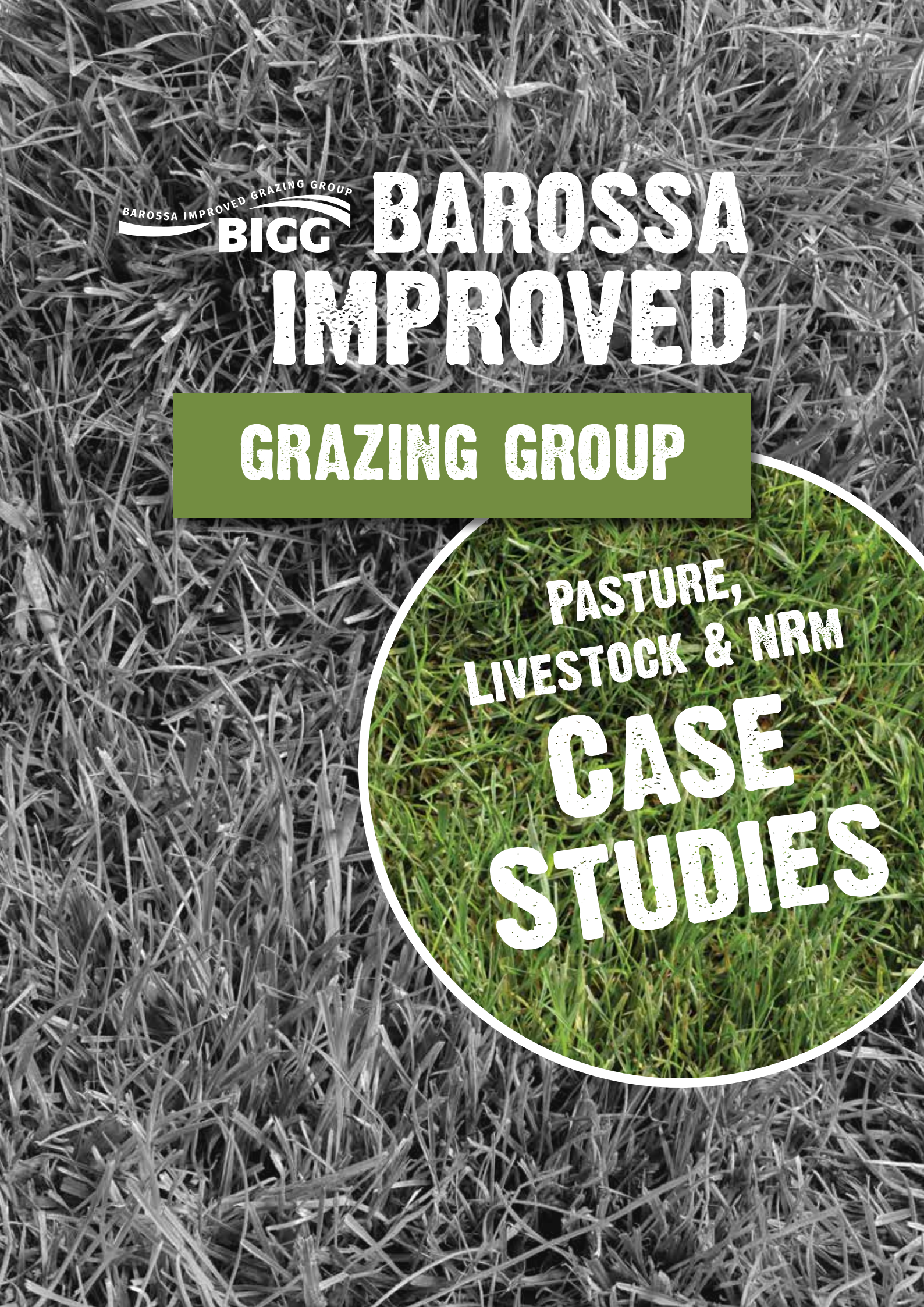
BAROSSA IMPROVED GRAZING GROUP
BIGG
BAROSSA IMPROVED
GRAZING GROUP
PASTURE, LIVESTOCK & NRM
CASE STUDIES

To share the learnings, achievements and innovations demonstrated in sustainable pasture management and on-farm NRM activities this booklet provides a range of case studies which were on-farm producer led demonstrations and trials through the 2012-2014 growing season in the Barossa and surrounding regions. They provide an insight into what has and hasn't worked and how issues can be overcome to improve management systems.

The opportunity to learn from others can be thought provoking and can help provide new ideas, allowing changes to individual management systems which can result in improved pasture management, and achieve on farm benefits.

We encourage you to use this booklet to investigate new ideas and implement something new into your own farming system.

ACKNOWLEDGMENTS

The Barossa Improved Grazing Group (BIGG) would like to thank all of the producers who have contributed to this publication who have taken the time to trial, demonstrate and most importantly share their different management techniques.

Also to those who took the opportunity to learn, discuss and get involved at the various events run through the course of the Projects.

In particular the following local producer groups who have been involved:

- Angaston Agricultural Bureau
- North Rhine Sheep Group
- Barossa Mid North Dairy Discussion Group
- Mt Pleasant Beef Group
- Koonunga Ag Bureau

These case studies could not have occurred without the grant funding and the support of the following stakeholders:

- Adelaide and Mt Lofty Ranges Natural Resources Management Board
- Caring for Our Country
- Department of Environment, Water and Natural Resources
- Sheep Connect SA
- Dairy SA
- MLA More Beef from Pastures
- Farmer Johns
- Landmark
- Rural Solutions SA

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For further information contact Georgie Keynes at georgie.keynes@biggroup.org.au or visit the website at www.bigg.org.au

Contents

Introduction

Since its inception in 2012, what is now known as the Barossa Improved Grazing Group (BIGG) has facilitated a variety of projects with an overall aim of improving winter pasture production and achieving on-farm NRM outcomes.

In 2012 a group of farmers, agronomists and industry personnel identified that sustainable winter pasture production is a large profit driver for grazing enterprises in the Barossa and surrounding areas. With this aim, the Angaston Ag Bureau applied, and was granted, funding through the Adelaide and Mount Lofty Ranges Natural Resources Management Boards Sustainable Industry Grant for the Winter Pasture NRM project. Sheep Connect SA also contributed funds towards this project.

This project facilitated local producers, via the local producer group network, to develop an individual 'Action Plan' to improve their winter pasture production and/or achieve NRM outcomes on their own properties. A series of pasture walks were run across the district to allow producers to network, share and learn from each other through their plans.

Issues examined included rotational grazing, improving soil condition, manipulating pasture species and varieties, utilising alternative fertilisers, property planning and watercourse rehabilitation.

In conjunction with the Winter Pasture NRM Project other projects were facilitated to provide demonstration opportunities in 2012/13. This included the following:

- **Caring for Our Country Temporary Electric Fence RAPPA Project, which aimed to improve rotational grazing opportunities;**
- **Department of Environment, Water and Natural Resources and Dairy SA Dairy Sustainable Soil's Focus Paddock Project, which provided the opportunity to look closer at different aspects of soil management on local dairy properties;**
- **Adelaide and Mt Lofty Ranges Natural Resources Management Boards Barossa and Fleurieu Bus Trip Project to facilitate trips to observe different pasture management;**

As a result of the success of this Project and to provide further opportunity for local producers to continue to learn and network into the future, in 2013 the Barossa Improved Grazing Group (BIGG) was formed.

This booklet provides a collation of on farm producer led trials and demonstrations which were developed and implemented through the variety of Projects facilitated over the 2012/13 growing season.

The 2012 growing season was a poor one for the Barossa area with half of the average annual rainfall, and very little rain through the winter and spring. In caused disruption to some of the trials however also provided a good demonstration of management decisions which can benefit the local farming systems in periods of increasing climate change.

The 2013 season was predominantly better with the opening break occurring in April and regional averages through the winter and spring.

Keyneton Pasture walk.
August 2012

INCREASING THE BIOMASS

JUNE 2012

NAME Ian and Fiona Koch
RAINFALL 530mm
ENTERPRISE Cropping/Merino Wool Self-Replacing Stud/ Prime Lambs
PADDOCK SIZE 30 Ha

BACKGROUND

Ian and Fiona Koch, over the past two years, have trialled the use of a polyculture break crop within their broadacre cropping program.

A polyculture crop consists of a wide variety of plants including cereals, legumes and broadleafs which are sown into, in this case, a cereal stubble. The aim of the crop is to increase the biomass of the pasture to control resistant ryegrass and also produce late winter/ spring feed to wean lambs onto from July-December.

Prior to the polyculture crop the paddock was continuously cropped for 10 years. The paddock was sown using conventional machinery.

2012 PROGRAM

A complete knockdown spray for Salvation Jane and Ryegrass was done in April which was prior to sowing in late May. Varieties sown included varieties of wheat, barley, oats, peas, beans, chicory and canola. They also trailled new varieties apin turnip and sulla.

The crop was also fertilised at sowing with 40-50kg/Ha DAP.

At the Moculta Pasture Walk in June the pasture measured 300kg DM/Ha and 50% bare ground. It was obvious that there were different germination times within the different varieties.

The wheat, barley and oats were 2-3 cm tall however other varieties such as the sulla were not germinated yet.

Ian set stocked the paddock with 430 lambs from July until December and found that they favourably grazed as a result of the maturity of the plants. Also they did not scour when they were first introduced to the pasture.

2013 PLAN

As a result of the success in the first year Ian and Fiona sowed the polyculture crop in April 2013 including more brassicas and chicory which performed well in 2012, however no sulla.

They also implemented a rotational grazing system using the temporary electric fence Rappa system. They divided the paddock into four which increased the stocking rate in each 'cell' and allowed the other areas of the paddock to have a rest. This increased the overall production of the pasture.

Pasture Cage displaying the amount of growth achieved through the growing season without grazing pressure.
October 2012

KEY OBSERVATIONS

1. Simulated rotational grazing- as the varieties have different growth habits the lambs grazed them preferentially at differing times of their maturity allowing some varieties to get away while others were being controlled.
2. Considering the season, the pasture in 2012 produced extremely well, chicory and ryegrass were still green in October.
3. Lambs did not scour on the pasture indicating very little loss in production.
4. They found that sourcing the seed for the different varieties was quite difficult, requiring more time than when using mainstream varieties.
5. Rotational grazing increased pasture production.
6. Will continue to implement a polyculture break crop into their system, with one paddock providing a two year pasture phase before the paddock goes back into the crop rotation.

Georgie Keynes and Hans Graetz observing the growth of the poly culture crop.
October 2012

MOCULTA CASE STUDY

PERENNIAL PASTURE ESTABLISHMENT

JUNE 2012

NAME Vic and Margie Patrick
RAINFALL 600mm
ENTERPRISE Fattening 130 steers
PADDOCK SIZE 2.7 Ha

BACKGROUND

Vic Patrick utilises his Flaxmans Valley property for fattening steers. In 2007 he originally sowed the paddock to a Farmer John's Hills Mix 550 which contained a mix of phalaris, fescue and clovers. However, due to a low stocking rate, the unpalatable nature and persistence of the fescue meant it began to dominate the pasture. It also formed large clumps around the paddock making it difficult to drive across.

PERENNIAL PASTURE ESTABLISHMENT

In 2012 Vic decided to re-sow the paddock with a perennial ryegrass, phalaris and sub-clover mix. The aim was to firstly remove the unpalatable fescue and improve accessibility around the paddock, increase pasture production using palatable species and improve soil cover through the summer months.

A soil test in 2007 indicated low organic carbon (1.8), nitrogen and nitrates (4.9), copper (0.29mg/kg) and zinc (0.5mg/kg). Also pH(cacl2) was 5 and 3 tonnes/Ha of gypsum was added. The pasture also received 100kg/Ha super in the last 7-8 years.

Prior to sowing the pasture was sprayed using a complete knock-down. Due to the late break, Vic sowed the pasture in June which is very late for a perennial pasture which in optimum conditions should be planted in April to allow it to germinate prior to the colder winter months.

As a result, at Eden Valley Pasture Walk in July there was 60% bare ground and the plants just germinated.

In October there was 2,400kg DM/Ha, which was one of the successes of the pasture, however there was a dominance of broadleaf weeds. Careful grazing management with the steers at a medium stocking rate for a short amount of time was required to ensure the pastures maintained vigour but were not overgrazed.

Eden Valley pasture walk in July 2012, there was 60 percent bare ground, plants just germinated.

KEY OBSERVATIONS

1. Perennial pastures need to be managed carefully to allow seed set in the first year (particularly clovers). This was particularly important as it was already moisture stressed.
2. Need to ensure good weed control prior to pasture establishment- particularly of broadleaves which were dominating the pasture in October.
3. Considering the drier season it may have been better to plant an annual pasture and then come in the following year with the perennial pasture.
4. Fescues are high in energy and protein however it is critically important to have a high grazing pressure from the start of its life to prevent it becoming 'clumpy'. It can be beneficial to have a pure fescue stand to allow high grazing pressure.

If there is a low grazing pressure fescue can become clumpy.

Perennial Pasture Paddock.
2,400Kg / DM / HA
October 2012

FLAXMANS VALLEY CASE STUDY

ESTABLISHMENT OF A LUCERNE PASTURE

AUG 2012

NAME Hans and Petra Graetz
SOIL TYPE Sandy Loam
RAINFALL 500mm
ENTERPRISE Wool, Merino Stud, Prime Lambs and Cereal Cropping
PADDOCK SIZE 33 Ha

Hans Graetz has found that including lucerne in his farming system provides reliable green feed to wean lambs onto and keep his stud rams growing through the summer months.

BACKGROUND

In 2010 Hans had an extremely successful establishment with a lucerne pasture. He planted it in September just prior to a very wet October and it is still producing well after 3 years. In the first summer Hans managed to dramatically improve the growth rate of his ram lambs by allowing them to have a green pick through the summer months.

The lucerne also helps to provide a natural fire break around his homestead through the summer months.

To compliment this pasture Hans decided to sow another lucerne pasture in 2012. He also included winter active plantain in the mix to try and provide year round feed. The paddock he chose was unimproved with a low number of perennial grasses, however it did have a good subclover base.

The paddock was fertilised every second year for maintenance and spray topped in 2011 to control grasses prior to sowing in 2012.

In early May the paddock was dry sown to – 5kg/Ha lucerne with a winter dormancy of 9
- 2kg/Ha plantain
- 1kg/Ha subclover

In August 2012 the pasture measured 2% lucerne, 5% plantain, 40% clover, 15% bare ground with the remaining grasses and broadleaves. It was then grazed at a low stocking rate of 850 lambs (25 DSE/Ha) to promote vigour.

In October the plantain and clover levels had reduced, as a result of the lack of moisture and the annual grass weeds were dominating the pasture. Spray topping the pasture could have been an option to help control these and prevent them setting seed in the following year.

PROPERTY PLANNING

In association with the pasture establishment, Hans subdivided the area into seven smaller paddocks and a laneway. This included fencing off the watercourse to prevent stock access.

Dividing the paddocks allows him to increase the stocking rate per hectare without increasing the size of the mobs.

Lucerne and plantain pasture. August 2012

KEY OBSERVATIONS

1. Plantain (winter active) and lucerne (summer active) complement each other to allow grazing all year round.
2. Lucerne has an extremely deep root system allowing it to access water and nutrients from below the soil. Also helps to control salinity and rising water tables.
3. Plantain contains high levels of minerals producing good quality feed for lambs.
4. Rotational grazing is the key to maintaining lucerne productivity and ensuring good soil cover.
5. Fencing the watercourse prevents stock access which improves water quality and reduces erosion.
6. The seasonal conditions play a critical role in determining pasture establishment success.

Successful 3 year old Lucerne Pasture. October 2012

Lucerne and Plantain Pasture. October 2012

KEYNETON CASE STUDY

KEYNETON CASE STUDY

LANDMARK PASTURE TRIAL SITE

NAME Craig John - Agronomist
Coopers Mt Pleasant

RAINFALL 650mm

AIM

- Trial different pasture varieties and mixes to determine their productivity within the local environment.
- Determine effective pasture mixes and early and late varieties.
- Trialling annual varieties within one plot and perennials within another.

PADDOCK HISTORY

- 2nd year of being used for a trial
- Perennial trial planted in 2011
- pH (water) is 5.1, phosphorus, potassium and magnesium levels are good.
- Unproductive weedy paddock

CURRENT PLAN

- Added 3t Dolomite lime to improve pH
- Annual varieties direct drilled 28/6/12
- Plots replicated twice to reduce variation

KEY OBSERVATIONS

1. Growing your own feed is one of the cheapest options to improve livestock production.
2. Annual rye grasses can be important to add to the mix to increase energy.
3. Important to include a variety of early and late maturing varieties to spread the grazing opportunities and seasonal risk.

KEY LESSONS

1. Huge variety of pastures species available to be utilised however it's critically important to understand their requirements prior to purchasing and sowing.
2. Important to ensure correct soil health, weed control and seed bed preparation prior to any pasture establishment.

SPRINGTON CASE STUDY

PASTURE TRIAL & DEMONSTRATION SITE 2012

Compiled by Craig John - Agronomy Services
Direct Drilled on 28/6/12

SOUTH WEST Fence Line

Buffer			
Cooee oats Diamond-TA Antas Sub Mintaro Sub (75)	Outback oats Subzero KxT brassica (80)	Cooee oats Diamond-TA Cheetah medic	Monstress Trill Burst-TA rye Taipan balansa Zulu II arrowleaf
Wintaroo oats New Tetila-TA rye (90)	Southern Green ryecorn Appin turnip (50)	Outback oats Jivet-TA rye Cavalier medic	Targa oats Morgan peas
Graza oats Capello vetch Antas sub Mintaro sub (95)	Cooee oats OZP902 forage peas (100)	Galileo oats Arnie-DA rye	Collossus oats Adrenalin-TA Pacer Leafy Turnip
Galileo oats Arnie-DA rye (90)	Collossus oats Adrenalin-TA Pacer Leafy Turnip (60)	Graza oats Capello vetch Antas sub Mintaro sub	Cooee oats OZP902 forage peas
Outback oats Jivet-TA rye Cavalier medic (95)	Cooee oats Diamond-TA Antas sub Mintaro sub (75)	Wintaroo oats New Tetila-TA rye	Southern Green rye Appin turnip
Cooee oats Diamond-TA Cheetah medic (95)	Monstress Trit Burst-TA rye Taipan balansa Zulu II arrowleaf	Targa oats Morgan forage peas	Outback oats Subzero KxT brassica
Row 1a	Row 2a	Row 1b	Row 2b
Buffer		Buffer	

MAIN ROAD

OPTIMISING LAMB GROWTH

NAME Phil Bellamy (manager)
LOCALITY Parawa
RAINFALL 700mm
ENTERPRISE Fattening 4000 ewes
FARM AREA 600 Ha

Phil spent 7 years selling 50 lambs per month directly to butchers. This very demanding job meant meticulous attention to detail including optimum paddock design, perfect rationing and a long lambing period, to ensure lamb growth rates so he could continue to meet the market specifications.

WHAT WORKED

- Weekly weighing gives very accurate information/ understanding of factors effecting growth rates
- Using a pelleted ration- ensuring very little variability within the product compared with hay and silage
- Paddock design played a very important factor
- Having an understanding of the factors effecting growth rates

WHAT DID NOT WORK

- Very demanding
- Seasonal variability including heat waves or thunderstorms caused huge variation in growth rates
- Year round lambing- more lamb marking, weaning, etc.

KEY OBSERVATIONS

1. Lamb growth rates were affected by inconsistent feeds, weather events, paddock geography.
2. To optimise growth rates it's important to have paddocks with shelter belts against the prevailing wind and paddock trees. Also important to maintain water quality by fencing off watercourses/ dams and having a reticulated trough system.
3. Very labour intensive and difficult to manage the system due to lambing all year round to supply markets.
4. Needed to use temporary electric fencing to prevent lambs sitting in shade and not eating. This also helps to prevent stock camps and soil degradation.

Visitng Maylands Property on the Fleurieu Bus Trip.

CHICORY & PLANTIN DEMONSTRATION

- Phil planted a trial paddock with one half chicory and one half plantain in 2012.
- He found the sheep walked straight over the plantain due to its unpalatable nature and only ate it once all of the chicory had been grazed.

KEY OBSERVATIONS

1. These two mixes are difficult to manage together as chicory can't be grazed too hard in winter which restricts grazing time for the plantain when it thrives in winter.
2. Due to the unpalatable nature of plantain- can be important to 'imprint' the lambs onto the pasture by grazing with the ewes.
3. Broadleaf weed control can be very difficult in these pastures therefore important to ensure good control prior to sowing.

Chicory and plantin pasture. April 2013

PARAWA CASE STUDY

TECHNO-GRAZING BEEF CATTLE

NAME Alistair Just

LOCALITY Hindmarsh Tiers

RAINFALL 900mm

ENTERPRISE Fattening 200 steers

FARM AREA 110 Ha (70 Ha utilised for grazing)

Alistair runs a meticulous techno-grazing system with innovative fencing, watering points and a great attention to detail to ensure the cattle get the most out of the pastures whilst maintaining its productivity.

The property was previously a dairy property with a kikuyu base. The productivity is such that he can run stock through autumn, winter and spring.

During these months cattle are moved every second day with the use of a quad bike and temporary electric fencing system.

Alistair also uses turkey manure as fertiliser.

KEY OBSERVATIONS

1. Low input system
2. Once the system is established and understood it's a very easy way of managing stock and making the most of pasture production
3. Stock are moved every second day and run at a DSE of 35/Ha
4. Steers are 'held back' in the winter (100-200g/d growth rate) to then optimise the spring pasture growth (2kg/d growth rate). Sold as an 18mth old yearling at 450-500kg. Beneficial by reducing soil issues in the summer months.
5. Labour unit works out to 1/4/ DSE or 1 day per month

The use of temporary electric fencing which is rolled out using quad bike facilities labour efficient pasture utilisation.

BENEFITS OF GRAZING IN VINEYARDS

NAME Karl Schiller

LOCALITY Menglers Hill, Angaston

RAINFALL 700mm

ENTERPRISE Vineyard and prime lamb production

PADDOCK SIZE 26 Ha vineyard

By utilising temporary electric fencing, Karl Schiller is able to see the benefits of grazing in vineyards which reduced herbicides, improved soil structure and reduced soil compaction.

BACKGROUND

Karl runs a 26ha vineyard but also has 400 merino breeding ewes which he runs on both his grazing country and vineyard. The vineyard has a permanent mid-row sward consisting of ryegrass, fescue and subclover, which are grazed in winter prior to bud burts. In 2013 there was also a greater proportion of capeweed in some vineyard blocks so Karl wanted to concentrate the sheep in these areas to help manage it.

TEMPORARY ELECTRIC FENCE SYSTEM

Using the temporary electric fence Rappa system, Karl divided an 8.5ha vineyard into two sections consisting of 5ha and 3.5ha separated by two electric fence wires.

On 6 August, 80 merino hoggets (equivalent to 1 DSE/hd) were introduced onto the 5 ha section (stocking density of 16 DSE/ha) and remained there until being removed just prior to bud burst on 4 September. At this stocking density the Feed on Offer (FOO) remained at about 2800 kg DM/ha over the 29-day grazing period.

Karl had originally intended to also graze the 3.5 ha section of the vineyard. However, due to the high amount of feed available and greater concentration of capeweed in the 5 ha section, he felt it was more important to keep the stock in this area.

By doing this Karl was able to reduce the potential for capeweed seed-set although ideally he would have liked to increase the grazing pressure (either through increasing the stocking density or grazed the same number of stock on a smaller area). By rotationally grazing between several sections Karl would have also increased pasture utilisation.

Karl saw first hand the benefits of the strategy and has since purchased his own system.

KEY OBSERVATIONS

1. Grazing reduces the reliance on herbicides for weed control including slowing the onset of herbicide resistance in key weeds such as annual ryegrass, which is an endemic problem in vineyards.
2. Temporary electric fencing can be easily incorporated into a vineyard system as it can be put up and down when required
3. Concentrating grazing in particular areas can help to control the prevalence and distribution of weeds

IMPROVING THE FLEXIBILITY OF THE GRAZING SYSTEM

OCT 2012

NAME Greg Koch
LOCALITY Moculta
RAINFALL 450mm
ENTERPRISE Wool/Prime Lamb/Fodder
FARM AREA 809 Ha

Strategic annual planning of stocking rates, pasture management, animal husbandry and target markets is essential for a good livestock enterprise. Within your annual plan you need to be flexible and make good tactical decisions depending on how the season unfolds. The 2012 season didn't unfold like many producers would have liked with a dry winter and spring. As a result Greg Koch changed his grazing plans to conserve more fodder from a sown feed paddock.

Background

In recent years, as a result of high machinery costs and increasing seasonal variation, Greg Koch has made a shift from cropping to livestock, resulting in Greg using the arable land to provide feed opportunities through grazing or conserving fodder crops.

The feed conserved from these paddocks is stored on farm in the form of hay or grain and fed back to stock in the paddock or in a confinement feeding area once the ground cover targets are triggered to remove stock from the paddock. In an average year the ground cover targets are 100% ground cover with 1200kg DM/Ha. This reduces the risk of soil erosion through wind and large rainfall events through the summer and early autumn. It also helps to maintain soil organic matter.

Supplementary feeding of stock is one of the strategies which allows Greg to have high stocking rates and maximise feed utilisation in above average seasons.

Utilising Fodder Crops In 2012

In early 2012 Greg sowed a 20ha paddock with a mix of Wintaroo oats, Morgan peas and Morava vetch to provide feed for his weaner lambs.

As the season progressed and the property received only half of the average rainfall though winter and early spring, Greg made the decision to conserve more fodder than he had originally planned. To facilitate this and continue to allow some grazing of the paddock Greg divided the paddock in half with temporary electric fence and the RAPPA™ system. This allowed one half of the paddock to be grazed while the other half was made into hay.

The 10has that was not cut for hay was grazed with 290 merino ewe hoggets rated at 1.5 DSE from 26 September until 22 November. The stocking density was 43 DSE/ha for 26 days or 1118 DSE grazing days per ha. There was 2000kg of DM/ha on offer when the stock went in and they were removed when there was 400kg/ha which was the level required to maintain ground cover.

A three wire electric fence erected using the Rappa system.

It was estimated that each hogget had an intake/ wastage/natural decay of 2.1kg of DM per head per day. If the paddock was grazed as a whole 20ha, this figure would have been greater due to more trampling, spoiling and wastage. The remaining 10ha produced 35 400kg bales of hay which was 1,400 kg of DM per ha.

'Cut & Carry' Improves The Feed Utilisation

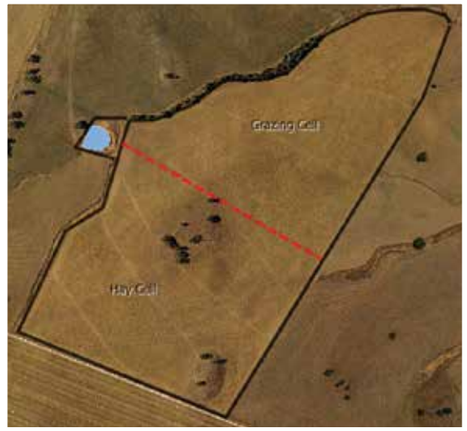
The 10ha that was cut for hay could have been grazed and provided another 26 days of feed however, the feed quality would have been slightly lower. The amount of feed wasted can be reduced through grazing management but it is hard to ration feed intake out in the paddock without doing damage to the pasture and reducing surface cover.

The advantage of making the hay is that it can be rationed out in a confinement feeding area. In a confinement feeding area the hoggets require 1 kg of the good quality hay per day to maintain weight compared to the 2.1kg that they were eating/wasting when grazing in the paddock. Therefore in a confinement feeding area if 95% of the hay was utilised (estimating 5% wastage) the hay would have provided feed for the 290 hoggets for 46 days which is 20 days more than if the 10ha was grazed. Obviously there is more labour and cost involved with cutting and carrying feed but in a poor season such as the 2012 season getting an extra 20 days worth of feed out of your paddock is worth it.

Using Temporary Electric Fencing In Cropping Paddocks

Temporary electric fencing as demonstrated in this situation shows the flexibility that it can provide by subdividing large cropping paddocks to improve feed utilisation.

Even though Greg is not investing in larger cropping machinery there are still many advantages of having larger paddocks for cropping even with the small equipment he operates.



Some of the benefits of making smaller paddocks include:

- Increasing stocking density which reduces selective grazing and provides for a more even graze
- Facilitates rotational grazing
- Reduced tracking around the paddock and therefore trampling and feed wastage
- Isolate areas that stock camp. For example if there is a hilltop in the paddock the stock can be isolated from it
- Maintaining ground cover above 70%
- Maintaining feed quality all over the paddock rather than some areas going rank and feed quality declining
- Utilising excess feed by making hay. The feed can be stored and used to fill a feed gap in autumn. If stored in a shed the hay would be better quality than if it was left in the paddock as standing feed
- Reduced spoilage through faeces and urine

KEY OBSERVATIONS

1. **Temporary electric fencing provides flexibility to conserve excess fodder.**
2. **Temporary electric fencing is a flexible and efficient way of subdividing cropping paddocks.**
3. **The Rappa™ machine makes temporary electric fencing labour efficient.**

David Woodard, Georgie Keynes, Wes Seeliger and Damian Slade measuring pasture growth which is important to ensure correct pasture utilisation.

DECISION MAKING FOR PADDOCK SUBDIVISION

OCT 2012

NAME Greg Koch
DATE October 2012
LOCALITY Moculta
RAINFALL 450mm
ENTERPRISE Wool/Prime Lamb/Fodder
FARM AREA 809 Ha

Greg Koch has a focus on implementing a rotation grazing system to improve pasture management and utilisation. Implementation requires consideration of issues such as land classes, stock numbers, pasture varieties and expensive infrastructure such as fencing and watering points. Greg, like many producers is not 100% confident in knowing what is the best set up and due to the costs associated with setting up a system it is important to ensure the 'best fit' is achieved. Utilising temporary electric fencing can help to work around some of these issues prior to the development of a permanent system.

BACKGROUND

Since 2004 Greg has implemented many changes to his property to improve his grazing management and sheep enterprise. He has fenced off creek lines, built a containment feeding area and is making the change from cropping to predominantly a livestock enterprise.

Changing from cropping to pastures has meant converting cropping paddocks to pasture paddocks. In 2006 Greg converted a 38ha paddock, which was continuously cropped, into a perennial pasture of phalaris, cocksfoot, fescue and clover.

Greg chose a perennial pasture because it can:

- Survive for many seasons
- Increase water infiltration and use. Perennials have a longer growing season so produce more feed
- Depending on the variety, perennials can respond to rainfall at any time, especially at the break of the season
- Form a stable vegetative cover to reduce erosion and nutrient run off especially on hilly country
- Provides good quality and quantity of feed for livestock
- Is tolerant of extended grazing

FENCING FOR ROTATIONAL GRAZING

After the paddock was sown Greg set the pasture up for rotational grazing by subdividing the paddock into four paddocks with a central water point.

He used a permanent four wire electric fence incorporating two live and two earth wires. Steel posts were used with insulators on the live wires, so Greg could convert back to the cropping system if required however, the system is still in place today.

Good points of the system include:

- Easy to move stock through the water point from paddock to paddock
- Reduced selective grazing of pasture
- Even grazing in each cell with no camping or tracking
- Surface cover targets are easier to achieve across the whole area

Cell 1, on the left after grazing and Cell 2, on the right before grazing.

Bad points of the system include:

- Can only run one mob of sheep due to the central water point
- With Greg's flock structure and numbers he still finds paddocks of 9.5ha too large for 600 weaners to graze efficiently. With this stocking density in one cell the graze period in spring becomes too long before they can get on top of the feed and be moved. As a result the cell is grazed unevenly and the feed in the other paddocks goes rank.

Utilising Temporary Electric Fencing To Subdivide The Paddocks Further

In 2012, even though the spring was very poor, Greg divided two of the cells in half using a three wire temporary electric fence with tredins spaced every 10m. The fence was powered from the existing permanent electric fence. The Rappa™ machine was used and it took 30 minutes to install 300m of fence and 20 minutes to wrap it up which made it a quick, easy and a cheap process.

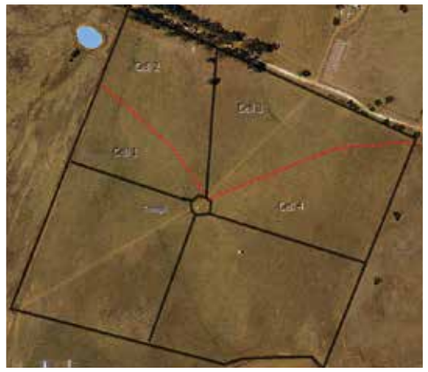
Grazing The Paddock In 2012

The pasture was rotationally grazed by 640 weaners rated at 0.9 DSE (Table 1). Due to the season Greg needed as much feed from the pasture without causing ground cover problems.

Greg's normal minimum benchmark for ground cover is 1200kg of DM/ha but due to the circumstances at the end of grazing period there was 80% ground cover and 400kg of DM/ha which is not ideal but acceptable. Greg was impressed with how the high stocking density for a 2-4 day graze resulted in no stock tracks or camps.

The Future

Although there was only 800-900kg of dry matter on offer in the paddock to graze Greg saw the benefits of having smaller paddocks and a shorter graze period. Greg will trial again in 2013 and if he thinks that the paddocks should be 4-5ha in size then he will implement further permanent electric fencing.



RAPPA SYSTEM

KEY OBSERVATIONS

1. Temporary electric fencing can be used to help design paddocks for rotational grazing.
2. If the temporary fence is in the wrong position it can be easily removed.
3. Temporary fencing allows you to trial different scenario's to improve grazing management.

Table 1: Grazing Details for the Cells Grazing 640 Weaners (DSE 0.9)

Cell	Cell Size Ha	Days Graze	Before Grazing kg DM/ha	After Grazing kg DM/ha	Stocking Pressure DSE/ha	Intake and wastage per DSE kg DM/ DSE/day
1	2	2	850	460	230	0.84
2	2.5	2	960	450	230	1.1
3	4	4	800	400	144	0.69
4	4	3	750	400	144	0.81

Measuring the pasture quantity 850Kg DM Ha in Cell 2 prior to grazing.

RAPPA SYSTEM TEMPORARY ELECTRIC FENCE

LIFTING THE STOCKING RATE TO THE NEXT LEVEL

NOV 2012

NAME Joe Keynes
DATE November 2012
LOCALITY Keyneton
RAINFALL 500mm
ENTERPRISE Wool/Lamb/Beef Cattle/ Cropping
FARM AREA 6800 Ha

Joe Keynes has been focusing on his stocking rates and livestock production for many years. Joe understands that stocking rate is one of the main profit driver of his livestock enterprise and the biggest driver of feed utilisation. The challenge Joe is faced with is how to increase the use of the pasture he already grows, and how far to push his stocking rate to remain profitable and sustainable.

Background

In 2012 Joe focused on strip grazing a 10ha second year perennial pasture of phalaris, cocksfoot and sub clover. The aim was to increase the amount of feed utilised and reduce the amount of feed wasted through stock trampling and spoiling.

In November 2012 at the end of a very poor growing season due to a lack of rain, the paddock was subdivided into three cells using temporary electric fencing.

The Rappa™ machine was used to roll out 800m of two wire temporary electric fence. The Rappa™ machine reduced the time required for erecting and dismantling the fence. However, Rappa reels only hold 500m, so when putting out these long stretches a number of reels were required and the wire needed to be joined using a figure eight knot.

To enable water access a laneway was established when the stock were grazing Cell 2. This was easily achieved by manually moving 50m of the tredins and wire.

A portable battery operated energiser was used to power the fence. Towards the end of each graze period some sheep were jumping through but this was as a result of the battery going flat and the volts dropping in the fence. Ideally over 5000 volts should be maintained in the fence.

Grazing Management

In October the paddock was grazed with 300 six month old merino ewe lambs (Table 1). A lamb at 40kg and growing at 50 grams per day is rated at 1DSE. The paddock was grazed with larger mobs of sheep during the winter months however, as a result of the season, this was the final graze for the year.

The stock were moved according to food on offer. When the pasture reached 500kg DM/ Ha, they were moved to the next cell. Ideally Joe's targets are much higher at 1000 kg/DM/ ha, however in the dry season he needed to balance the production and pasture benefits. This was the final graze for the season which would allow the pasture to rest and recover over the summer months prior to the autumn break.

According to Joe the high stocking density of over 120DSE/ha with a short graze period of 5 days reduced feed wastage and improved ground cover compared with running a small mob in the paddock for 2-3 months which can results in tracking and camping.

It is critical, particularly in a dry season to maintain 70% groundcover at all times. This will reduce the risk of soil erosion in the form of wind and water events which can remove large amount of important top soil which will lead to decreased pasture performance and management issues.

Risk Management

Joe has managed high stocking rates on his property by monitoring pastures, understanding pasture growth and regularly condition scoring stock. Every year's pasture production is different and there are risks associated with running more stock and increasing pasture utilisation. Over stocking can cause poor pasture persistence, barer paddocks especially in late summer/autumn, and more supplementary feeding.

These risks can be managed by having a plan in place to cope with the seasonal variation. There are a number of options to deal with the poor season and one option Joe uses is a confinement feeding area to feed stock in rather than out in the paddock when his surface cover target of 70% is reached.

KEY OBSERVATIONS

1. High stocking densities results in an even graze, less selective grazing, more feed utilised and even ground cover levels.
2. At higher stocking densities monitoring pasture is critical as damage to pasture and soil can occur quickly compared to set stocking.
3. Have written plans including pasture and livestock condition targets in place to deal with seasonal variation.

The Rappa temporary electric fence machine.

Prior to grazing Cell 3, on the left 1500Kg DM/ha and Cell 2, displaying 500Kg DM/ha.

Table 1: Grazing Details for the Cells Grazing 300 Ewes Lambs (DSE 1)

Cell	Cell Size Ha	Date in	Date out	Days Graze	Before Grazing kg DM/ha	After Grazing kg DM/ha	Stocking Pressure DSE/ha	*Pasture Utilised kg DM/DSE/day
1	2	4/11/12	9/11/12	5	1500	500	150	1.33
2	2.5	9/11/12	15/11/12	6	1500	500	120	1.38
3	5.5#	15/11/12	26/11/12	11	1500	400	30#	1.48

*** This is estimated and includes intake and wastage # Note the last graze was the whole paddock (10ha) as the fences were taken down so the stock could have access to water.**

SUMMER PASTURE TRIAL

DEC 2012

NAME Jen Light
LOCALITY Eden Valley
RAINFALL 650mm
ENTERPRISE Prime Lamb
FARM AREA 120 Ha

Jen Light trialled a summer fodder crop to create livestock feed and also to prepare a paddock for a perennial pasture renovation.

Paddock Selection

Jen had the ideal paddock to demonstrate a summer fodder crop. The 3ha paddock is situated along the North Para River which floods in winter preventing livestock access and machinery access. The pasture was unproductive prior to the demonstration, consisting of annual grass weeds such as barley grass and wild oats.

Jens aim was to grow a summer fodder crop to control weeds, improve surface cover and produce higher quality feed through summer and autumn. Jen also planned to plant a perennial pasture in 2013 so the trial was used to help clean up the paddock prior renovation.

Demonstration Details

The 3ha paddock was divided into two 1.5ha paddocks. One area contained the summer fodder crop and the other provided a control area allowing comparison between the two pastures. The areas were divided using a three wire temporary electric fence powered by a portable battery operated energiser.

The fence was 100m long with tredins spaced every 10m. The RAPPA™ machine was used to put the wire out and pick it up. This process took 20 minutes to roll the fence out and 10 minutes to pick it up.

Summer Fodder Crop

On 17 October, after receiving 17mm of rain, the paddock was sprayed with a complete knockdown using Roundup and sown to different mixes of pearl millet, titan rape and apin turnip.

Feed Quality

On 5 December a sample of the summer fodder crop was sent away for a feed analysis. The results showed that the feed was 28% dry matter, had a Metabolisable Energy (ME) of 10.5 MJ/kg Dry Matter (DM) and a protein of 12.8 %.

This was considerably higher than the dry grass in the control area which was estimated to be 7-8 ME and 6-7% protein.

The feed quality provided by the summer fodder crop was well above maintenance feed quality of 8 ME and 8% protein required for Jen's dry ewes.

Grazing Results

To prevent overgrazing within the demonstration area, the two areas were grazed separately with 150 Border Leister X Merino dry ewes (rated at 2 DSE), which resulted in a stocking pressure of 120 DSE/ha. The ewes respected the electric fence which was cruical considering they had never experienced an electric fence before.

Grazing Of The Control Area

The control was grazed for 9 days from 11 December. At the start of grazing there was 3500kg DM/ha and the sheep were taken out at 1500 kg DM/ha resulting in 1.85kg of dry matter being consumed/wasted per DSE per day.

Grazing Of The Fodder Crop

The fodder crop had 3 days of grazing. The first grazing was on 20 December, the second grazing on 7 January and the third grazing on 3 March. Each time the pasture was around 1000-1200kg DM/ha and taken down to 600-800 kg DM/ha. The total dry matter utilised was 1,550kg per ha which was 2.8 kg consumed/wasted per DSE per day.

During the demonstration period the paddock only received 51mm of rain after a dry winter and spring. The summer fodder crop did not perform in this season but it did demonstrate that the varieties used could survive in a dry summer even though they did not produce large amounts of dry matter.

In a normal spring and summer the summer fodder crops should perform well and provide improved grazing days.

In retrospect, having a run off paddock with dry feed would have been ideal within this situation, so the ewes could mix their diet preventing any toxicity issues which can occur with summer fodder crops.

Grazing Considerations

The following should be considered when grazing summer fodder crops:

- Have a good fresh water supply and quality hay, oats or a run off paddock
- Ensure correct timing of grazing
- Don't put hungry stock on the crop
- Consider the use of mineral supplements such as sulphur when grazing sorghum
- Understand the livestock disorders/toxicities which can occur under certain conditions and check stock regularly.
- Stock should have a consistent feed supply. It takes around two weeks for the rumen to adjust to different feed so once grazing a summer fodder crop it is good if the stock can stay on for a long period. Therefore complete a feed budget to work out the area required or how many sheep are required
- Consider different varieties and planting times which can spread the timing of grazing

Summer trial area prior to March grazing at 1000kg DM/ha.

KEY OBSERVATIONS

1. Temporary electric fencing can be used to control graze summer fodder crops.
2. Be aware of the animal health issues with grazing summer fodder crops.
3. Summer fodder crops can provide higher quality feed in summer and autumn than dead annual grass.

Ewes respecting the fence prior to grazing the trial area in the front, December 2012.

MAKING THE MOST OF EARLY FEED BARLEY

JUNE 2013

NAME Glen and Tracy Becker

LOCALITY Koonunga (north of Nuriootpa)

RAINFALL 480mm

ENTERPRISE Cropping/Sheep/Cattle/ Vineyard

FARM AREA 404 Ha (plus leased blocks)

Glen Becker and his daughter Tracy have decided to pay more attention to increasing pasture utilisation and reducing the amount of feed that they waste in their grazing system by implementing a rotational grazing system. This will enable them to increase their winter grazed stocking rates and make their livestock enterprise more profitable.

Background

The Becker's decided to focus on a small area in 2013 to get an understanding of the practicalities of the system before expanding it over a larger scale on their property.

They chose two parallel 5ha paddocks close to the shearing sheds and cattle yards which could be monitored regularly and connect directly into an established electric fencing system. Due to the close proximity to the yards, the paddocks are grazed by weaner cattle and heifer calving mobs through the winter months and sheep at shearing time in September.

In 2013, the two paddocks were sown on 26 April with barley and DAP. The aim was to provide early feed to meet the winter feed gap demands and provide feed through the spring.

Setting Up The System

At the end of June the two 5ha paddocks were subdivided in halves to make four 2.5 ha paddocks using temporary electric fencing. A laneway was also constructed to provide access to water.

To prevent tracking through the laneway area, a wagon wheel style layout could have been used however it would have made the application of urea and progibb more difficult.

On 28 June a Rappa™ machine was used to roll out the two temporary electric fences. The Becker's used two live wires and tredins spaced every 10 meters apart. To facilitate grazing for both sheep and cattle the wires were placed on the top and middle holes of the tredins, creating a top wire at 1.2m and a bottom wire at 0.6m. However it was noted that some of the tredins were being pushed around by the cattle

The temporary fence linked into the existing off-set single line electric fence system which was powered by a mains energiser located in the shearing shed.

Grazing Management

The Becker's decided to utilise the feed with 250kg Murray Grey x Angus weaners. They also had the option to graze with a mob of 20 rams which graze in vineyards near the trial paddocks.

Nine weaners went into the first cell on 30 June with 2000kg DM/hectare feed on offer. On 12 July, when there was 1200kg of DM/ha remaining they were moved to the next cell. The stocking rate of the 2.5 ha paddocks was 43 DSE/ha and an overall stocking rate of 10.8 DSE/ha for the whole 10ha.

The nine weaners were unable to keep up with the growth rate of the barley resulting in pasture in the other cells going rank. Therefore twenty rams (40 DSE) were used to graze Cell 4 to utilise the feed and maintain the quality.

Some areas of the first cell were being pugged and areas of the feed were trampled and wasted. This was a result of the stock being in the in a cell for too long (12 days).

If the paddocks had not been subdivided some areas of the paddock would been over grazed because the weaners would have continued to graze the short more nutritious regrowth in their favourite part of the paddock This would result in less pasture produced and utilised while other areas of the paddock would go rank.

Lessons Learnt

Start grazing earlier as cereals can be grazed, once anchored, to a height of 10cm. Stock can intake the same from a 1000kg DM/ha short dense pasture as a 300kg DM/ha cereal. Just be aware that it will not last as long.

A shorter graze period with a higher stocking rate would benefit the plant by not grazing the regrowth and allow the plant to re-energise.

Shorter graze periods would reduce the pugging problem by preventing camping and tracking. If pugging is still an issue, the animals should be shifted or be spread over the whole 10ha (eg. 2 weaners in each cell).

Have more volts in the fence to create a larger field around the wire and prevent the cattle rubbing on the tredins.

Have the water system set up with a pipe along the edge of the paddock so a portable trough can be shifted with the cattle. Quick release fittings or cam locks can be utilised to make shifting quick.

A simple feed budget and understanding pasture growth rates allows you to match an appropriate stocking rate. If the crop is growing at 20kg of DM/day then it can be stocked at 20 DSE per hectare (allocate 1 kg of green DM per DSE per day).

Erecting the fence: two live wires and tredins spaced 10m apart.

Example 1

When the weaners were put in at 2000kg DM/ha, just to keep up with the growth rate it should have been stocked at 200DSE (10ha x 20kg DM/ha/day growth). The Becker's stocked the 10ha at 108 DSE so you could predict that the feed would get ahead of them.

Example 2

If the Becker's wanted to take the barley back from 2000kg DM/ha to 1200kg DM/ha they had 2000kg of DM available to eat on 2.5ha. If you allocate 1 kg of DM per DSE per day to graze the 2.5ha in 5 days (not taking into account any new growth) the Becker's would have required 33 weaners (rated at 12 DSE -aiming for growth rate of 1.2-1.5kg LW per day)

KEY OBSERVATIONS

1. Start grazing cereals early but let them rest and recover to ensure productivity.
2. Understand pasture growth rates and feed budget to set stocking rates and improve feed utilisation.

Grazing in cell 1 on the left at 1200kg DM/ha prior to grazing Cell 2 on the right.

RAPPA SYSTEM

A SIMPLE FOUR PADDOCK ROTATION

JUNE 2013

NAME Joe Keynes
LOCALITY Keyneton
RAINFALL 500mm
ENTERPRISE Wool/Lamb/Beef Cattle/ Cropping
PADDOCK SIZE 6800 Ha

With the implementation of a high intensity, four paddock rotational grazing system on his property Joe Keynes has been able to improve feed utilisation, produce more feed and maintain soil cover targets.

Background

Joe Keynes is planning to sow a 20 ha paddock, which was previously in a cropping rotation, into perennial pasture in 2014. Perennial pastures provide a longer growing season therefore produce more feed and a more stable vegetative cover to reduce soil erosion and improve water infiltration.

To establish a successful perennial pasture, weed control must be achieved prior to sowing. Joe began preparing the paddock in 2012 by growing an oats and vetch hay crop to reduce weed seed set. In 2013 tetila annual ryegrass was direct drilled in early May with single super applied in June. The pasture was intended to be sprayed out in spring to stop weeds setting seed but also be used to provide early feed for ewe hoggets to ensure they grew out over the winter months.

Paddock Subdivision

Temporary electric fencing was used to subdivide the 20ha paddock into 3 sections. Included in the rotation was a 3ha paddock that was already permanently fenced.

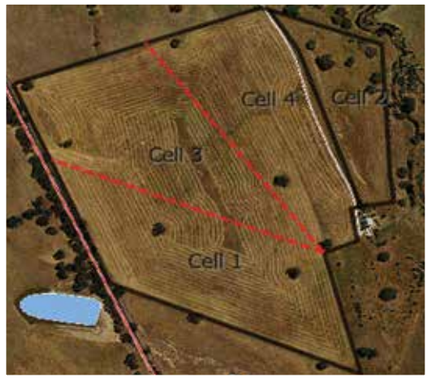
Joe used two live wires and tredins spaced at 20m to construct a 700m and 800m fence. With the use of the Rappa™ machine it took 1 hour to install the fence. The Rappa™ machine worked successfully and significantly reduced the time required for erecting the fence.

The fence was powered by a portable energiser which required the battery to be changed every 3-4 days. Joe believes that key is to have a large energiser, conductive wire, a good earth and good connections. At times when the battery was flat the sheep continued to respect the fence as a result of the large amount of feed in the paddock.

Rotational Grazing

Annual ryegrass benefits from a light early graze to promote tillering. In early June, the ryegrass was monitored by the "twist and pluck test" to work out when it was ready to graze. This test involves grabbing the ryegrass plant at grazing height, pulling and then twisting. If the stem and leaf breaks off then it is safe to graze. If the plant is pulled out of the ground the roots are not anchored and it is not safe to graze.

Due to the moisture content of the feed in winter (around 85%) no water was supplied.



A mob of 200 ewe hoggets rated at 1.5 DSE per head were rotated through the four paddocks. The grazing period in each cell ranged from 5 days to 12 days depending on the paddock size therefore the paddocks were rested for 25 to 30 (Table 1).

It is important to measure the remaining feed on offer after grazing to assess if the cell has been under or overgrazed. If the pasture has been grazed below 800kg DM/ha (2-3cm) this will result in less leaf and slower recovery as well as the soil exposed to erosion. Leaving a good residual of 1000kg DM/ha (4-5cm) will result in faster pasture recovery and growth and provide good ground cover. If the pasture is above 2500kg DM/ha (12cm) not enough of the feed has been eaten and this will result in poor feed quality at the next grazing.

If the paddock was not subdivided the stocking density would be 15 DSE/ha. By running one mob in smaller areas the stocking density increased to 40 DSE/ha and up to 100 DSE/ha on the 3 ha section.

KEY OBSERVATIONS

1. Stocking density can optimise pasture growth and quality.
2. Stocking density can reduce selective grazing, improve feed utilisation and maintain ground cover above 70% to prevent erosion.
3. Temporary electric fencing can be used to subdivide paddocks and increase stocking density.

Benefits Of Intensive Grazing

By utilising the subdivision, Joe has noticed that the stock have stopped camping, tracking and baring out areas, improving ground cover. It has also reduced selective grazing, ensuring increased and even tillering of the pasture and preventing stock walking around the paddock selecting the highest nutrition feed, trampling and wasting feed in the process.

Rotational grazing the cells also allowed the plants time to recover after grazing which contributes to more feed grown.

The Future

Due to the success of dividing the paddock with the temporary electric fence the paddock will be permanently subdivided into 3 sections to allow for rotational grazing. Joe plans to use a wagon wheel design with a permanent water trough in the centre of the paddock.

Table 1: Grazing Details for the Cells Grazing 300 Ewes Lambs (DSE 1)

Cell	Cell Size Ha	Date in	Date out	Days Graze	Before Grazing kg DM/ ha	After Grazing kg DM/ ha	Stocking Pressure DSE/ha	*Pasture Utilised kg DM/ DSE/day	#Pature Growth Rate kg DM/day
1	7.5	11/6/13	23/6/13	12	1200	700	40	1.04	37.5
2	3	23/6/13	28/6/13	5	1500	800	100	1.4	25
3	7	28/6/13	8/7/13	10	2000	900	43	2.5	100
4	5.5	8/7/13	19/7/13	10	2200	700	54	2.7	20

*** This is estimated and includes intake and wastage # Calculated from the previous before grazing measurement. The first measureent was from germination.**

SMALLER PADDOCKS INCREASE STOCKING DENSITY

JUNE 2013

NAME Graham Keynes
DATE June 2013
LOCALITY Moculta
RAINFALL 450mm
ENTERPRISE Wool/Prime Lamb/Beef Cattle/Cropping
FARM AREA 6800 Ha

Temporary electric fencing has been used successfully by Graham Keynes to improve grazing while lambing in June. Graham grazes his ram breeding mobs on improved perennial pasture during lambing. The mobs are small due to the ewes lambing down in sire mated groups. After lamb marking at the end of July, when the lambs are identified to sire groups, mobs are joined up and continued to be rotational grazed.

Paddock Subdivision

A 28ha hilly paddock with a phalaris, cocksfoot and subclover pasture was subdivided into two 14ha paddocks on 11 June. The hill in the paddock was split off from the flat using a two wire 800m temporary electric fence which was constructed using the RAPPA™ machine. Dividing the paddock according to landclass allows the flat to be grazed separately and prevents the sheep camping on the hill and overgrazing it.

Grazing Management

The pasture had not been grazed until lambing in 2013 and was saved to provide the ewes with a lower worm burden pasture. Saving the pasture also allowed good quality feed to accumulate ensuring the ewes could consume their required daily pasture to meet their nutritional requirements.

A mob of un-scanned 60kg ewes with around 100% lambing can be rated at 3DSE per ewe (this includes the lamb). For simple feed budgeting 1 DSE requires 1 kg of green dry matter (DM) per day. Therefore a ewe and lamb requires 3kg of DM per day. For ewes to get their daily requirements from a pasture it needs to be above 1000kg DM/ha for singles and 1500kg DM/ha for twins and above 75% digestible.

There was 1800kg of DM/ha on offer when the paddock was first grazed which meets the requirements of twin bearing ewes. The paddock was grazed with 105 ewes that started lambing in the last week of June (Table 1).

Stocking Density And An Even Graze

With these small mobs of lambing ewes, the stocking rate and stocking density in the 28ha paddock, without the use of temporary electric fencing would be 11.25 DSE/ha. Once split in half the stocking rate is still 11.25 DSE/ha but the stocking pressure increases to 22.5 DSE/ha.

A stocking pressure of above 60 DSE/ha in this environment, would allow for an even graze and quick graze period across the paddock allowing the pastures to remain in the Phase 2 growth stage. Once lambing finishes, mobs can be put together to increase the stocking density.

Rest And Recovery

There are 3 phases of pastures growth:

Phase 1 is below 800-1000kg DM/ha and could be at the break of the season or after grazing. Pasture growth is slow as there is insufficient leaf area to capture sunlight. If grazed for long periods at this level the pasture production will be low and issues such as weeds, and erosion could occur.

Phase 2 is between 800-2500kg of DM/ha and is when rapid pasture growth occurs as there is more leaf to captures sunlight and produce pasture. The benefits of keeping pasture in growth phase 2 is that it producers more pasture of good quality, avoids wastage, recovers quickly after grazing and provides protection to maintain ground cover above 70%.

Phase 3 is above 2500kg of DM/ha and the pasture growth rate starts to decline as new growing points are shaded. The feed quality also declines as older leaves die and the plants start to mature.

Graham used a simple 2 week graze, 2 week rest rotation and the use of the temporary electric fence allowed him to achieve this even with small mobs. The rest allows the pasture to recover and grow more feed keeping the pasture in growth phase 2. After the plants are grazed they are able to produce more leaf from stored energy reserves and once recovered they replenish these reserves and are ready to be grazed again.

KEY OBSERVATIONS

1. Temporary electric fencing can be used to reduce paddock size and increase stocking density, particularly in situations where mob size cannot be increased.
2. Temporary electric fencing can be used to facilitate fencing to landclass.
3. Aim to keep pasture in growth stage.

A two line temporary electric fence being erected using Rappa.

Temporary electric fencing improves flexibility for grazing pastures with small mobs.

Table 1: Grazing Details for the Cells Grazing 105 Pregnant Ewes (DSE 3)

Cell	Date in	Date out	Days Graze	Before Grazing kg DM/ ha	After Grazing kg DM/ ha	Stocking Pressure DSE/ha	*Pasture Utilised kg DM/ DSE/day	#Pature Growth Rate kg DM/day
1	11/6/13	20/6/13	9	1800	1000	22.5	4.9	
2	20/6/13	4/7/13	14	2000	1500	22.5	2.9	#22
1	28/6/13	17/7/13	13	1500	900	22.5	3.4	##35

*** This is estimated and includes intake and wastage # Calculated from the previous before grazing measurement**
Growth since last graze.

PRODUCTIVE PASTURES ASSISTS EROSION MANAGEMENT

DEC 2013

NAME Andrew Koch
LOCALITY Moculta
RAINFALL 525mm
ENTERPRISE Dairy/Fodder Conservation
FARM AREA 323 Ha

Areas of erosion cause huge production losses on farming properties and need to be managed appropriately in order to ensure the losses are minimized and controlled.

Productive pastures play an important role in controlling and slowing water movement across the ground and holding the soil in place. They are also beneficial in stopping dirt particles which may have started to move with the water.

Andrew Koch implemented a complete paddock renovation including a perennial pasture, alternative watering points and fencing to improve a degraded paddock, helping to manage the erosion issues and also provide a more productive area to run his livestock.

BACKGROUND

Andrew purchased the 5ha hilly paddock in 2008. He used it for stock grazing but it was still considered relatively unproductive with little organic matter, broadleaf weeds, Guildford grass and some annual grasses.

Prior to 2008, the paddock had been continuously cropped and was heavily grazed over the summer months. This resulted in large areas of bare ground which further increased the risk of erosion, specifically around a large gully.

PROPERTY MANAGEMENT

Andrew incorporated the management of the erosion area within his whole property management plan to ensure he could achieve NRM and production benefits. The erosion gully flowed into an existing creekline with an in-stream dam. Therefore Andrew fenced off the entire erosion gully and watercourse to prevent stock access and allow further rehabilitation of the area.

Andrew also established alternative watering points through the use of a solar pump, tanks and trough system. This watering system has benefited the entire block by allowing the establishment of troughs in three neighbouring paddocks. This will further facilitate rotational grazing even in the summer months as a result of having permanent water in these paddocks.

Tim Prance and Andrew Koch prior to pasture improvement.

Pasture Improvement

To improve the paddocks productivity and assist with erosion management by ensuring permanent ground cover, Andrew sowed a perennial pasture.

Preparation began in October 2012 when he sprayed out the annual grasses with glyphosate to stop seed set.

Prior to sowing in June 2013, Nutrilime was applied to improve the soil pH (4.7 CaCl2) and then the paddock was sown to a perennial pasture mix (Farmer Johns Hills 450 Blend) and Cavalier medic. Urea was also applied to the established pasture in September 2013 to increase production.

Pasture Establishment Cost (5 ha)*

October 2012 - knockdown and insect spray

Roundup (l/ha) + Lemat (50ml/ha)	= $128

June 2013 - sowing

Seed - FJ450 Hills Pasture Blend (16kg/ha)	= $648
Cavalier medic (5kg/ha)	= $155
DAP fertiliser (100kg/ha)	= $445
Nutrilime (2.66t/ha)	= $424
Contractor spreading and seeding	= $604

September 2013 - nitrogen application

Urea cost and spreading (100kg/ha)	= $396
Total	= $2800
Cost/ha	**= $560/ha**

*Establishment costs excludes owners time/ machinery costs

Perennial Pasture Impacts Ground Cover & Dry Matter

Through establishing a perennial pasture Andrew improved ground cover and therefore reduced the potential of land degradation.

Immediately before sowing (June 2013), ground cover was highly variable with pasture cut results ranging from 40 to 90% across the paddock. In contrast, groundcover levels in November 2013 were consistently above 95% across the paddock.

Likewise the pasture production improved, with 460kg Dry Matter (DM)/ha being measured in January 2013 compared to 2000 kg DM/ha in December 2013.

Through improving his pasture Andrew successfully increased its productivity while maintaining the natural resource base.

The improved perennial pasture will increase dry matter and feed availability throughout the year, allowing him to maintain more consistent and potentially higher stocking rates. The increased groundcover will also reduce weed infestation and provide better soil protection. This is particularly important in reducing run-off and therefore erosion to the existing gully in the paddock.

Key Observations

1. **Ensuring more than 70% ground cover helps to control soil erosion and weeds.**
2. **Perennial pastures provide year round ground cover and their long roots help to stabilize the soil.**
3. **Erosion control can be done within a whole property management plan to ensure benefits are maximized.**
4. **Perennial pasture not only has beneficial nrm outcomes but also provides year round feed.**

ON-FARM DAIRY EFFLUENT MANAGEMENT

DEC 2013

Name Murray & Ben Klemm
Locality Moculta
Rainfall 525mm
Enterprise Dairy/Fodder Conservation/Cropping
Farm Area 550 Ha

With the cost of conventional fertilisers on the rise, alternative fertilisers are being seen as cost effective and beneficial for improving soil fertility.

One such product is dairy effluent, which contains manure, urine and wash-down water that is collected daily from milking sheds and yards. In many cases the effluent is collected and stored on property in dams. Murray and Ben Klemm have been utilising this waste product and applying liquid dairy effluent to their property since 2003 with an aim to improve soil fertility.

Background

The Klemms run a 200 Friesian cow dairy herd with year round calving as an integral part of their farm business. They aim to provide year round on-farm feed to their herd through the use of improved pastures and fodder conservation.

Waste from the dairy is collected via two effluent dams to separate the liquid and solids. The solids sink to the bottom of the dam and the liquid, which sits on top, flows into an adjoining dam. The solids are kept on site until they are dry and then sold to local nurseries.

In March each year, the liquid effluent is removed from the dam by a contractor and spread using a 20,000 litre tanker over 76 ha of cropping and pasture paddocks.

For the past 10 years 26,000 L/ha/yr has been applied over these paddocks. Application can only be conducted in March as this is when the tanker is available.

Liquid Effluent Analysis & Application

Since the Klemms have begun applying liquid effluent to their property, it has never been analysed for nutrient levels or its effect on soil fertility investigated. In March 2013 the Klemms applied liquid effluent to three paddocks:

- Annual pasture consisting of oats, ryegrass and clover
- An unimproved grassy clover paddock
- Cropping paddock where triticale grain was harvested

Just prior to spreading, liquid effluent samples were collected and analysed. The results indicated that three key nutrients for soil fertility were present at high levels:

- Potassium (K): 420 ppm
- Phosphorus (P): 71 ppm
- Nitrate (N): 379 ppm

At high levels these nutrients can have both positive and negative effects on soil fertility. However, comparison of recent and past soil tests provided by DairySA across each of the applied paddocks indicated that the application rate of 26,000 L/ha/yr over the last ten years had no detrimental impact on soil fertility. Therefore the high level of nutrients in the soil were being lost before they became available to the plants.

Nutrient Uptake

The form the nutrient is stored in impacts it's availability to the plant. For example only 70% of the nitrogen available in liquid effluent is in a form which is available to the plant.

Interestingly, most potassium found in effluent is suspended in the liquid component and is 100% available to the plant, suggesting it is a highly valuable source of potassium.

The availability of nutrients is also determined by its form and vulnerability to environmental processes. Nitrogen is not generally stored in the environment as it can be readily lost as water-soluble nitrate through leaching, or in gaseous forms such as nitrous oxide through denitrification or ammonia through volitisation. Alternatively it can be 'immobilised' and incorporated in plants and soil organic matter. The same principles can also be applied to total Phospherous.

Timing Of Effluent Application

The March application of effluent on the Klemms property resulted in most of the high levels of nutrients in the liquid effluent being lost to the atmosphere or through leaching.

The application of effluent in spring could be more beneficial since plant growth and therefore nutrient requirements are much higher leading to quicker uptake of nutrients before environmental processes take hold. It may also be better for the Klemms to focus on applying effluent to paddocks of large nutrient removal, such as those used for hay or silage rather than pasture paddocks.

Further Considerations

Application of liquid dairy effluent to paddocks are an effective method of reusing and relocating nutrients however it is important to be aware of the environmental risks which can result from it's use.

Risks occur when effluent is applied to saturated soils resulting in nutrient-rich run-off which can result in watercourse pollution. Also if one paddock continuously receives excessive effluent which can result in soil infertility.

While utilising liquid effluent on farm is ideal for the Klemms, the timing of application is a limiting factor. If effluent were applied in spring (compared to March), it would most likely improve plant growth, however this could be investigated further, including using suitable equipment that allows application in spring when the soil is moist.

Tim Prance and Ben Klemm in an effluent treated pasture paddock
October 2012

KEY OBSERVATIONS

1. Liquid dairy effluent higher in nutrients than solids.
2. Spring versus autumn application of liquid effluent will likely improve plant growth

Effluent treated paddock prior to treatment.
January 2013

DAIRY SOIL FOCUS PADDOCKS

EXPLORING ANNUAL AND PERENNIAL PASTURES

DEC 2013

NAME Anthony & Chris Steinert
LOCALITY Flaxman Valley
RAINFALL 800mm
ENTERPRISE Stud beef cattle and farm contracting
HERD SIZE 200 breeder Angus stud

Anthony and Chris Steinert use both perennial and annual pastures within their system to provide a diversity of grazing opportunities for their Angus stud. They optimise their grazing through the growing season and store the remainder through hay and silage which is fed back during the drier periods.

Annual pastures provide a bulk of growth through the winter and spring growing season. However, provide no grazing through the summer months and must be managed carefully to ensure ground cover levels remain above 70%.

Conversely perennial pastures are more likely to persist through the summer months due to their deeper root system providing greater levels of ground cover and grazing opportunities.

BACKGROUND

In winter and spring, paddocks are rotationally grazed for 1-2 days and then rested for 30 days, while in summer the 'gates are opened' and cattle are supplemented with hay (1.9 tonnes/head/year). Generally in April, paddocks are shut up for seeding and cattle moved to a 'sacrifice' paddock.

The Steinerts identified three different pasture paddock types on their property, with each being soil tested in 2013.

Annual unimproved pasture: predominately barley grass, 100kg/ha single super applied, grazed only, 'sacrifice paddock through the summer months'

Annual ryegrass pasture: sown to Adrenalin (at 25kg/ha) 100kg/ha urea applied, usually cut for silage annually and rotationally grazed at 264 DSE/ha

Perennial cocksfoot/phalaris pasture: (planted in 2003), receives chicken manure annually, usually cut for hay annually and is grazed in spring to prevent clumping in summer.

EFFECT OF PASTURE TYPE ON SOIL FERTILITY

While heavily influenced by paddock history, the nitrate levels were notably lower in the perennial pasture versus both annual pasture paddocks (Table 1). This is a result of the deeper perennial root system which can access nutrients at depth, such as nitrates in the sub soil. These extra nutrients help to extend the growing season. The extended growing season also supports an increase in annual nitrate utilisation.

The level of Phosphorous was much higher in the unimproved paddock compared to the annual and perennial pastures. This is a result of the removal of plant material (via production of hay and silage) from these pastures which prevents nutrients being returned to the soil. The addition of soil ameliorants or feeding the hay and silage in the pasture paddocks can help to rectify these levels.

Table 1: 2013 Soil Nutrient Levels

	Annual Unimproved	Annual Ryegrass	Perennial Cocksfoot/phalaris
pH ($CaCl_2$)	4.7	4.2	4.5
Organic Matter (%)	5.4	4.5	6.0
Elec. Cond. (dS/m)	0.12	0.09	0.08
NO3-N (ppm)	8.2	11.3	3.3
Phosphorus Col (ppm)	196	55	36
Sulphur	14	12	12

MAINTAINING GROUND COVER

In April 2013, pasture paddocks were measured for dry matter (DM) residue and groundcover. As was expected the perennial pasture displayed 70% ground cover which is the recommended level to minimise soil loss.

Through structured rotational grazing management, Chris and Anthony were able to maintain 85% groundcover through late summer and autumn in the annual ryegrass pasture which would significantly reduce the erosion risk through wind and heavy rainfall events.

Annual ryegrass: 1033 kg DM/ha, 85 percent groundcover.

SACRIFICE PADDOCK

One of the success factors of Steinert's system is the use of the sacrifice paddock which is utilised to hold stock for extended periods of time where they are fed hay or silage. Although one paddock is overgrazed, in this case there was only 33% ground cover, however the remainder of the property was looked after to maintain more desirable levels above 70%.

In the future the sacrifice paddock can be re-sown with an annual pasture as it is likely to have increased soil fertility as a result of the accumulated hay, silage and manure.

Annual unimproved pasture: 267 kg DM/ha, 33 percent groundcover.

Integrating Annual And Perennial Systems

In 2013 both the annual ryegrass and the perennial cocksfoot/phalaris pasture paddocks were cut for silage, however key differences were noted in their production and timing of growth.

The ryegrass produced up to 15,000 kg DM/ha, however there was little growth early in the season. In comparison, the perennial pasture produced 8,000 kg DM/ha, and after silage was cut in early July continued to be grazed. This integrated system allowed the Steinerts to rotationally graze paddocks on their property for 2-3 days (with a 30 day rest) until mid September.

The characteristics of a farming system will affect the specific role and value of perennial pastures within that system. The mix of soil type, nature of livestock enterprise, balance of crop and pasture production all affect where perennial pastures can be grown and their profitability.

In the Steinerts enterprise, both annual and perennial pastures have been successfully grown and managed. Although during the growing season perennial pastures do not produce as much feed as annual pastures, they spread production throughout the year while minimising input costs and labour associated with repetitive annual pasture renovation.

Key Observations

1. **Maintain groundcover above 70% to minimise soil loss.**
2. **Utilise both annuals and perennials pastures to maintain pasture production.**
3. **Rotational grazing encourages further pasture growth and reduces weeds.**
4. **Sacrificing a paddock can be utilised to conserve soil cover on the remainder of the property.**

Tim Prance and Anthony Steinert in the annual ryegrass pasture. October 2012

Glossary

Confinement Feeding -
Can also be known as containment feeding is an intensive feeding system for maintaining animals in a confined area where the feed and water are supplied.

Dry Sheep Equivalent -
DSE: A measure based on the feed requirement of a 50kg dry sheep at maintenance condition score 2, used as a measure of stocking intensity.

Dry Matter -
DM: Dry weight of plant matter, measured in kg/ha.

Feed Budgeting -
A system used for closely matching pasture feed supply and grazing animal demands.

Hogget -
A young sheep of either sex which is 1-2 years old.

No-Till -
When the crop is planted into undisturbed soil using equipment with narrow seeding points.

Pasture Topping -
A method of reducing grass seed set in a pasture utilising grazing and herbicide application.

Seed Bank -
A reserve of seed in the soil which has the potential to germinate in coming seasons.

Stocking Rate -
The number of animals grazing a set unit of land for a specific period of time.

Volunteer Pastures -
Pastures that have not been sown, but instead consist of plants that are naturally present.

Further Reading

Barossa Improved Grazing Group
www.bigg.org.au

Barossa Improved Grazing Group is farmer driven, servicing the Barossa district and surrounding areas. The aim of the Group is to help producers improve pasture production and achieve on-farm NRM benefits.

Meat and Livestock Australia (MLA)
www.mla.com.au

MLA is a producer-owned company, working in partnership with industry and government to achieve a proditable and sustainable red meat and livestock industry.

The website features a range of resources and calculators that are available to help manage your business:

MLA feed demand calculator
Stocking rate calculator
MLA cost of production calculator
Phosphorus Tool
Pasture Improvement Calculator

Adelaide and Mt Lofty Ranges NRM Board
www.naturalresources.sa.gov.au/adelaidemtloftyranges/home

The Adelaide and Mount Lofty Ranges (AMLR) Natural Resources Management (NRM) Board works to manage, protect and, in some cases, restore the region's precious natural resources.

Sheep Connect SA
www.sheepconnectsa.com.au

SheepConnect SA is supporting the development of the SA Sheep Industry and is 'connecting people in the business of sheep'. SheepConnect SA is a partnership between Australian Wool Innovation Limited, Eyre Peninsula Natural Resources Management Board and Grain & Graze 2 (EP).