

Green feed in a drought!



Much of Western Australia has just experienced its driest annual growing season on record. This followed an unusually wet summer. Climate change or not – having perennial pastures in your farming system is looking a whole lot more attractive. If this summer is another wet one, the interest in perennials will reach fever pitch. But the proof needs to be in the pudding. As these photos show, existing perennial pasture stands have not only survived the drought conditions, but have thrived on what little rain did fall.

They are now poised for explosive growth if we do get summer and autumn rains.

On the left is a 3 year old stand of Evergreen Mix at Doug Parker’s north-east of Mingenew. Pictured is Tim Wiley with an exceptional individual plant of Gatton Panic growing on a lighter part of the paddock. Photo 12 October 2006. On the right is a 3 year old stand of Gatton Panic and Rhodes grass at David Cook’s of Dandaragan. This paddock is high in the landscape yet continues to push out new growth despite the dry conditions. It supports local trial data suggesting Gatton Panic is one of the very best species for the sandplain north of Perth. Photo 23 November 2006.

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Southern Snap Shots - Spring 2006



Andrew Kuss of Esperance sowed kikuyu for the first time this year. Fortunately he sowed in late August and has had an excellent establishment on these very poor non-wetting sands. It has been a tale of two springs in Esperance. This year had a very short finish and only the earliest sown paddocks have germinated. Last year early sown paddocks had to endure a lengthy period of cold and wet conditions (and heavy insect pressure) and many failed as a result. No two years are the same in farming...
Photo 17 October 2006.

The Bradshaw family from west Tambellup sowed this paddock on 20 October 2005. The site is often too wet for cropping. A mixture of lucerne, chicory, tall wheat grass, tall fescue, plantain, Gatton panic, Bambatsi panic, and siratro was sown. The late spring and wet summer produced a good establishment with most species present. The paddock was crash grazed for 4 days in May and September with large numbers of sheep. Because the chicory has gone to head and is setting a lot of seed, the Bradshaw's will attempt to harvest some shortly. Photo 13 November 2006.



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From the President



Erin Gorter, Kojonup, Phone: (08) 9833 7524

Welcome to the December edition of the Evergreen Farming newsletter.

Firstly, I'd like to take this opportunity to thank David Monks, our "outgoing" outgoing president for his years of time and commitment to Evergreen Farming. David has been a driving force behind your producer driven group, enabling Evergreen Farming to become the proactive, progressive, highly regarded group that it has become throughout this state.

Being my first column as President of Evergreen Farming, I'd like to take the opportunity to introduce myself and share some of my background. My husband Thys and I farm south west of Kojonup, just on the edge of "The Cold Zone". We produce prime lambs, wool and grains. Pastures are a major focus of our efforts and we continue to add value to our annual pastures by using perennials in certain parts of our landscape. In the past three years we have used the Evergreen Mix, chicory and lucerne. Next autumn we will be seeding Tall Wheat Grass with strawberry clover after seeing it growing successfully and being grazed productively in our area at a recent Evergreen Field Day. As you can see, we try to practice what we preach!

This season has been challenging for most of us and with the lack of rain we personally have regretted not having more perennial pastures on our farm. There are many species that fit well with our annual pasture that we could have been utilising, especially in the upcoming summer and autumn. Maybe next year!

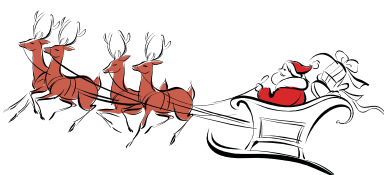
Thankyou to all those who attended the AGM held at Technology Park in October, including the CEO of Heritage Seeds, Jim McDonald, who gave a very interesting insight into the seed industry. Evergreen Farming strives to develop strong linkages with many groups and businesses in the agricultural industry across Australia for the benefit of Western Australian farmers. Evergreen Farming will continue to work closely with the seed industry to try and ensure the quality and quantity of seed to cater for the increasing interest in both temperate and sub-tropical perennial pastures.

I would like to invite you all to keep in contact with myself and the committee, giving us feedback on how to continue to offer value for your membership dollar. You will be sent a short survey soon so we as a committee can assess your member needs and convince the funding bodies that they should be supporting Evergreen projects. Please take the time to fill in this survey so we can clearly demonstrate the need for research, development and extension in this state. Being a producer driven group, Evergreen Farming has increasing credibility and needs your feedback to continue to be relevant to those of us out in the paddock.

We wish you all a safe Christmas and hope 2007 brings us all a good season.

Yours in green

Erin Gorter



A special thank you to NLP
for all their help this year



Australian Government
Department of Agriculture, Fisheries and Forestry
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A perennial alternative to the annual “Use it or lose it”

Philip Barrett-Lennard, Evergreen Farming, Ph: (08) 9475 0753.



Peter and Allannah Smith of Bremer Bay think that if farmers north of Perth can grow perennial pastures so can they. Especially so given the likelihood of summer rain along the south coast. Historical rainfall records show they get at least 75 mm of summer rain (Nov to Feb) in 3 out of every 4 years, and 100 mm of summer rain in 3 out of every 5 years. An opportunity not to be missed!

This summer rainfall is hugely detrimental to standing dry feed. Department of Agriculture trials on Peter and Allannah’s farm showed that on average 3 tonnes per hectare of standing dry feed is lost to decay by the end of January without even any grazing. The slogan “use it or lose it” was termed to encourage farmers to utilise the spring flush before it decayed before their eyes in summer. Unfortunately this is easier said than done, unless considerable hay and silage is conserved or there is access to large amounts of crop stubble.

Peter thought that perennial pastures had a big role to play turning a negative (summer rain) into a positive. He comments that historically, dry summers were usually good stock years as the dry feed remained high in quality. It was the wet summers that caused problems with the rapid decline in the quality and quantity of dry feed. With perennials in the system, the loss of dry feed in a wet summer can easily be compensated for with perennial growth.

Peter thinks perennials bring a few other significant benefits to his farming system including (a) their extra water use that will help to control rising water tables and salinity, (b) the extra ground cover that prevents wind erosion esp. during winter storms, and (c) the reduced need for extra machinery and/or land due to the higher productivity and lower inputs of perennials.

The Smith’s have now sown 4 paddocks to perennial pastures. 3 paddocks were sown in 2003 to a mix of mainly sub-tropical

grasses including Whittet kikuyu, Callide and Katambora rhodes, Bambatsi panic, Gatton panic, Splenda setaria, millet and lucerne. One paddock was scarified and then seeded in late September following a knockdown of Glyphosate and Ally in early September. This paddock received 70 mm of rain on the 30th of September which helped to firm the seedbed and produce an excellent germination. Another paddock was sprayed in early October and then seeded in the 3rd week of October using a no-till combine fitted with coulters, Walker double disc openers and press wheels. Given the conserved moisture from the heavy late September rain and the minimal disturbance another excellent germination resulted.

Both paddocks now contain an excellent density of perennial grasses. Kikuyu is gradually taking over, although the other grasses have also performed very well. The lucerne was killed by a herbicide used to control melons in the establishment year. However, Peter is not concerned about the loss of the lucerne as the sub clover component of these paddocks is excellent - fixing plenty of nitrogen for the perennial grasses.

To illustrate the productivity of these paddocks, Peter purchased a line of 127 ex-Pastoral steers in March 2005 and placed them into a paddock of perennials. The steers stayed a whole 12 months before being live exported. During that time the paddock produced an impressive 366 kg of live weight gain per hectare. Peter predicts the Gross Margin was approximately \$315/ha which compares very favourably with cropping.

Another paddock sown in 2003 was a deep sandy rise that was always prone to erosion. It did however support a good blue lupin stand. The perennials have performed exceptionally well, helping to stabilise the fragile sand and provide out of season feed. Not surprisingly the perennials look the best where the



Lush green kikuyu responding to the increased nitrogen supply under blue lupins. Photo 1 December 2005.

“Use it or lose it” - continued

blue lupins are thickest. Their incredible nitrogen fixation is significantly enhancing both the growth and quality of the perennial grasses.

With a good year in 2005, the Smith’s decided to sow another paddock to perennials. Given the ability of kikuyu to spread around the farm on its own, and to choke out other perennials, they decided to remove kikuyu from the mix this time. A mixture of Rhodes, Gatton panic, Strickland Finger grass and Phalaris was sown with ~1 kg/ha of each species used. Given the excellent seasonal conditions, the vigorous sub clover proved very difficult to kill, even with 2 knockdown sprays. Seeding was delayed until just after a 21 mm rainfall event in late November when the sub clover had finally died. Again the no-till combine was used to conserve moisture.

Some of the perennials germinated immediately from the ample stored soil moisture but another major germination occurred in January after heavy rain associated with two ex-cyclones. By early April the paddock had almost complete perennial ground cover and all species had established well. The successful establishment of phalaris at this time of year is somewhat of a surprise but shows what is possible with a full profile of moisture and a wet summer.

Peter is keen to include a combination of both winter and summer active perennials in future sowings to provide

insurance against winter droughts. The Gairdner area can have the odd tough winter with cool and dry conditions. He believes a temperate perennial grass that is highly winter active would provide an advantage compared with emerging annual pastures in these years, especially in early winter. He is thinking of using winter active Tall Fescue and Phalaris.

On part of that paddock Peter mixed the perennial seed with some oats to act as a cover crop. He reflects that the sowing rate of oats at 10 to 15 kg/ha was too high as there was obvious competition between the oats and the perennial grasses. In future he would either leave out the oats or drop the rate to around 5 kg/ha.

Peter concludes that perennials are a great tool in managing climate risk. Harvest rain, once despised, is now not all bad news given that the area sown to perennials is similar in size to the cropping program. And even though he suspects the productivity of a purely annual system would be superior to perennials in an above average growing season, most farmers never have enough stock to capitalise on this. But in a poor growing season, the productivity of the perennials will be superior to the annuals, reducing the need for de-stocking and/or expensive supplementary feeding. A more resilient and sustainable farming system with less risk has got to make sense.



Ex-pastoral steers profitably turning perennial pastures into 366 kg/ha of live weight gain. Photo 1 December 2005.

Potential for perennial pastures in the Warren Catchment

Paul Omodei, Agrom Management, Manjimup, Ph: (08) 9777 2980.



Paul Omodei shows onlookers some deep-rooted Chicory at the recent Warren River Field Days

Farmers in and around the Tone and Warren River Catchments were provided a unique opportunity to see high and low rainfall perennial pasture systems in action at a two-day field tour held in September.

A co-ordinated effort between Evergreen Farming and the Department of Water, the field tour served to introduce farmers to perennial pasture systems, to learn more about their on-farm value and how best to establish and manage them.

The tour aimed to complement a new South West Catchment Council project - The Tone and Upper Warren Salinity Recovery Project which has a strong focus on the use of perennial pasture systems to utilise salt affected land and arrest the spread of salinity throughout the catchment.

The project will assist farmers with establishment costs for perennial pastures and monitor their effect on stream salinity. To date, farmer interest in the project has been huge with expressions of interest for about 700 hectares of perennial plantings within the catchment.

Undoubtedly the field days would have fuelled much of this interest. The tour visited half a dozen properties with established perennial pasture systems in high and low rainfall areas. Species included perennial clovers, ryegrass, chicory, kikuyu, fescue and tall wheat grass.

It was a rare opportunity to see first hand the plants themselves and assess how they have coped in this dry season and hear from the farmers directly how they established and managed their perennial systems. It was an added bonus to have a panel of industry representatives who were able to point out opportunities and limitations of different perennial species.

Following is a summary of a selection of properties visited.

Colin & Shane Barber (perennial ryegrass, clover & herbs)

Father and son, Colin and Shane Barber, operate a dairy farm west of Manjimup. It is a high rainfall area and their pasture system includes a mixture of irrigated and dryland grazing.

Two years ago they began to trial perennial pasture species. The trial included a range of perennial ryegrass and clover species as well as the perennial herbs, chicory and plantain. A highly productive dryland system resulted, providing the knowledge to adapt this to other areas of their farm. Winter active perennial ryegrass, along with perennial clover species and plantain showed the most promise in the trial area.

Due to the nature of the seasons in the high rainfall area, Colin and Shane have been able to tie the perennial systems in well with their annual systems by concentrating on the grazing management of perennials in spring and utilising their annuals for fodder conservation. This has increased their utilisation of farm feed resources by 15% in two years.

In an average season, the winter active perennial pastures in their dryland system should provide quality green feed for dairy cows well into December.

In autumn, the perennial grasses can be grazed on average three to four weeks before the re-sown annuals, taking pressure off supplement feeding. This helps fine tune the Barber's productivity and cost effectiveness in a 'tight' industry.

Ian and Gary Ryan (chicory)

Brothers, Ian and Gary Ryan, run sheep and cattle and are also intensive horticulture producers near Manjimup. They decided to trial chicory to provide a highly productive pasture option for a finishing system (prime lambs).

A small trial was planted in a site which followed a horticultural crop in the spring of 2005.

In its first year of establishment, the chicory had, literally, "copped a hammering". With the late seasonal break and a winter with lower than average rainfall, the chicory had stood up well to heavy grazing pressure all season.

In March 2006, the plot suffered a huge set-back when the sheep broke through the fence and ate nearly every plant right down to the tap root. Ian and Gary could not believe how well the plants recovered. Within weeks the chicory had thrown off side shoots and grown back.

To improve the groundcover of the chicory site, the Ryan's used annual ryegrass, Winterstar, to oversow in autumn this year. This provided extra cover and extra feed which was

Potential for perennial pastures - continued

well needed during the dry winter. Feedback at the field day suggests that it would be advantageous to add a legume to the mix to reduce nitrogen inputs.

John Steele (kikuyu)

Still in the high rainfall zone of the tour, not far from the previous properties was John Steele's property where he runs a few beef cattle. While more of a hobby farmer, John's stocking rate was considerably higher than the district average of 12 DSE, and he put this down to the kikuyu in his system.

High on the side of a slope, in gravelly and sandy soil types, John's pasture demonstrated how kikuyu can be grown quite successfully within an annual system providing high value summer feed for his stock long after the annuals had died off. It was very impressive how the kikuyu had continued to spread up the slopes on soils where the season is significantly shorter than the lower lying flats.

As the tour heard a number of times during the field days, growing perennial grasses of any kind works well with clover, which provides additional nitrogen to keep grasses productive.

Michael & Diana Fryer-Smith (broad scale tall wheat grass)

Michael Fryer-Smith's is an incredible story. He grew up on the farm near the upper reaches of the Tone River and has been operating it since 1955. In his younger days, the Tone was fresh and supported populations of marron. Since the 1970s, the river and land has become progressively saltier.

In 2002 Michael used part-funding from the Water and Rivers Commission (now Department of Water) to establish 20 ha of a salt-tolerant perennial pasture mix of tall wheat grass, strawberry clover and some Roper ryegrass in parts of the worst-affected land. Although a lower rainfall area than those visited the previous day, the varieties seen here need to tolerate not only salt, but waterlogging, which they appear to do well.

The property was originally a sheep property, but now produces steer vealers for feedlot and about 40 stud bulls, sold annually. Michael has found his 300 breeders and other cattle do particularly well on the tall wheat grass paddock, even with set-stocking through summer, and the grass has responded well to this grazing regime. He believes the pasture has improved the growth rates of young cattle. The coverage of grass has also improved the appearance of the salt scalded areas.

So convinced of the grazing value of tall wheat grass, in 2006 Michael sowed a further 150 hectares on two properties. Michael and Diana now plan to convert more of their farm to tall wheat grass, planting in targeted areas before salt scalds



Michael Fryer-Smith shows the increased depth to water (approx 1.5m) in a paddock that would normally be waterlogged at this time of the year. The excellent density of tall wheat grass is evident across the paddock.

break out. Michael's enthusiasm has convinced many other farmers in the district to try salt-tolerant perennials.

Summary

The field days provided an excellent mix of both practical and research information over two days.

It appears that there are several perennial options available for farmers to consider that have shown consistently good results with relatively low risk in terms of cost and establishment. The three that I believe to have the most opportunity for farmers in the Warren River Catchment are:

1. Tall Wheat Grass due to its slightly higher tolerance of salt and ability to maintain good quality when grazed properly. An excellent companion with strawberry clover.
2. Kikuyu due to its dire ability to not die. Sure it doesn't like frost and the winter but we have several opportunities to use an annual system (ryegrass and clovers appear the best) in conjunction with kikuyu to improve year round productivity. It is very robust and is suited to both sheep and beef systems.
3. Winter active tall fescues which can close down and become dormant when the season cuts off protecting them from our harsh summers. Grazing management in the spring is a critical factor in maintaining the persistence of species such as fescue. The winter active feature allows the plant to provide additional quality feed early in the season and at the end of spring.

Enriching livestock and the landscape

Dean Revell, CSIRO Livestock Industries, Floreat, Ph (08) 9333 6492.



Enrich: 20,000 shrub seedlings going in at Badgingarra Research Station.

When considering provision of forages for profitable livestock production, we used to think mostly about total annual biomass production and peak nutritive value. But really there is so much more. A more complete set of criteria also includes:

- Seasonal distribution of edible feed
- Impacts on water use, especially in deep-rooted perennials
- Complementarity with other pasture species, in terms of nutrient provision for grazing animals and co-existence in plant mixtures
- Resilience to fluctuating environmental conditions
- Minerals, vitamins, digestible fibre (i.e. not just protein and energy)
- Provision of plant compounds with medicinal properties to improve gut health; e.g. anthelmintic properties or improved rumen health
- Collateral benefits, often termed ecosystem services e.g. interactions with pest or beneficial invertebrates.

Of course, many of these items are second nature to Evergreen Farming members, especially the issue of year-round green feed and deep-rooted perennials.

The 'Enrich' project aims to consider this full range of characteristics. It focuses on exploring the potential for forage shrubs, in combinations with herbaceous plants, in profitable and sustainable systems. Our attention on shrubs arose due to the desire to develop systems incorporating deep-rooted perennials that can perform in low-medium rainfall zones and/or in soil types that have become marginal for cropping.

Past investigations into forage shrubs quickly indicated there is little scope beside saltbush and tagasaste, and even these

required a lot of work to develop functional systems. But we believe that, if we assess new plants for the range of potential attributes listed above, we might reach a different conclusion.

Our first efforts are being directed (although not exclusively) to Australian native shrubs that, in a sense, come to us already adapted to the climate. Many native shrubs are an important part of the feed base in rangelands, but have not received much attention for agricultural zones due to a lack of productivity and/or presence of secondary plant compounds. However, the potential for forage shrubs to be matched with herbaceous species (perennial or annual) to enhance the year-round distribution of feed (noting that out-of-season feed has been valued at up to ten times the equivalent feed in spring) means we should not evaluate a candidate shrub species as if it were going to be used in a shrub monoculture.

Plant secondary metabolites (PSM) have traditionally been viewed as a negative to livestock, and referred to as anti-nutritional factors or toxins. Whilst some plants clearly are highly toxic, the effects on animals of secondary compounds is often dependent on their dose. There is growing evidence that many PSM can be beneficial at low concentrations. One of the most widely reported examples is the potential benefits of condensed tannins (at the right concentration in the diet) to protect protein from rumen degradation, reducing the risk of bloat, and controlling gastrointestinal parasites.

The main activities in the *Enrich* research project are:

1. Surveying producers who have, or are, using forage shrubs to collate experiences, views and suggestions
2. Economic modelling to help predict the whole-farm profitability of incorporating forage shrubs
3. Assessing propagation ease, establishment and growth of Australian native shrubs
4. Interactions between shrubs and herbaceous pasture species
5. Nutritive value of candidate forage shrubs, especially native species
6. Bioactive compounds in candidate shrubs, with an initial focus on rumen fermentation but to also include potential anthelmintic effects
7. Grazing behaviour and diet selection, and managing animals in plant polycultures

The project is a national collaboration with funding support from the CRC for Plant-based Management of Dryland Salinity, Meat & Livestock Australia, Australian Wool Innovation, and the Joint Venture Agroforestry Program.

Supplementary Feeding on Tagasaste

Bob Wilson, Tagasaste Seeding Specialists, Lancelin, Ph: (08) 9655 1055.

Introduction

Tagasaste (*Chamaecytisus proliferus*) is a perennial shrub native to the Canary Islands that was introduced to Australia in 1879 and has been used since then as a feed source by local farmers to maintain their livestock. It is a high-protein fodder browse tree. It was recognised in the early 1980s that there was potential for the plant to be used more widely in southern Australia as a feed source. It is suitable for planting on deep sandy soils with an annual average rainfall of over 350 mm.

However, it had been noticed that cattle grazing tagasaste were not gaining weight over the summer and autumn, and this was leading to producers being unable to finish cattle when prices rose in late summer and autumn. However, cattle were still maintaining weight and not requiring supplements to do so, as they would if they were grazing annual pastures.

Project Description

In 1997 a project headed by Dr Geoff Tudor of DAFWA was set up with the aim to develop grazing and supplementary feeding strategies which overcame the reduction in growth rate that occurs in cattle grazing tagasaste in summer and autumn. The project ran until 2003.

Principal Outcomes

The research showed that cattle grazing tagasaste in summer and autumn have a low daily intake, compared with winter and spring. The reason for this low intake is not obvious, given that tagasaste has high levels of energy and protein at this time of year. However, concentration of phenolic compounds peak during summer and autumn.

These phenolics, along with an increase in wax content of the leaves, are possibly plant “defence” mechanisms to stop over-grazing during dry periods. In addition to this low intake over summer and autumn, cattle grazing tagasaste suffer from poor rumen function, further reducing livestock productivity.

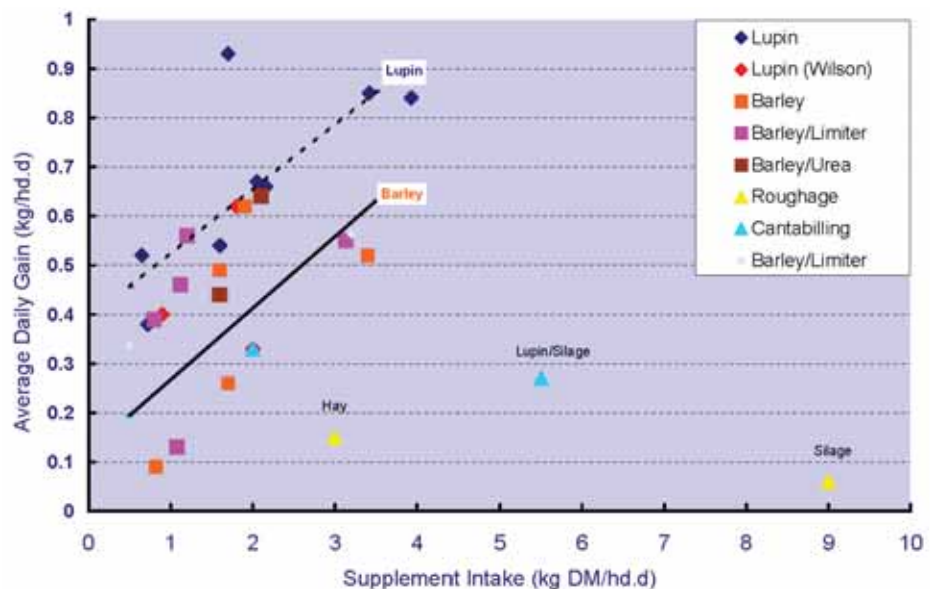
The most significant outcome of the project was the development of liveweight response relationships for (a) barley, (b) barley/urea, (c) hay, (d) silage, and (e) lupin supplements for cattle grazing on tagasaste. These allow farmers to “dial up” a desired level of production based on the economic and market conditions at the time.

Conclusion:

- The lack of growth in cattle browsing the tagasaste during summer was reflected in the poor rumen function during that time. Lupin supplementation was found to be the most effective way of correcting the problems of rumen function.
- Lupins produced almost twice as much rate of gain than did barley (with and without urea) for the same rate of supplementation.
- The project showed the following weight gain for the different rates of lupin supplementation:
 - o 1 kg/hd/day Lupin grain achieved 0.4 kg/hd/day liveweight gain
 - o 2 kg/hd/day Lupin grain achieved 0.6-0.7 kg/hd/day liveweight gain
 - o 3 kg/hd/day Lupin grain achieved 1.0 kg/hd/day liveweight gain
- Hay and silage (even with some lupins) were not effective supplements for cattle browsing tagasaste during summer as these feeds were eaten in preference to the tagasaste.
- In contrast, lupin supplements actually increased the intake of tagasaste by improving rumen function and therefore appetite.

These response equations can be used by producers as a tool for assessing the economic potential of feeding supplements over the summer and autumn period to meet specific markets.

Figure 1. Responses to the different rates of supplementation of the various feed sources used



Sub-tropical Perennial Grazing Trail at Badgingarra

Shanon Dellar, DAFWA Moora, Ph: (08) 9651 0540.

Grazing management is one of the most effective tools a producer has to alter pasture and livestock performance. When using rotational grazing it is important to understand the response of plant species to grazing pressure, as both stock density and grazing period can affect diet selection, pasture composition and re-growth potential. While various agronomic aspects of sub-tropical perennial grasses have been investigated, little study has been done to identify best grazing management practices and how well these grasses meet the nutritional demands of cattle. A trial was constructed at the Badgingarra Research Station to examine these gaps in knowledge, with the objective to:

1. Compare cattle production under two grazing regimes of sub-tropical perennial grasses (set stock vs rotational)
2. Examine how the recovery, growth and quality of sub-tropical perennial grasses are affected by grazing
3. Establish guidelines for the grazing of sub-tropical perennial grass pastures for producers

Sixty hectares of the perennial 'Evergreen Mix' (rhodes grass, signal grass, gatton panic, setaria and bambatsi panic) was sown in September 2005. These 60 ha was fenced into six 10 ha paddocks (3 set stocked and 3 rotational), with the rotational paddocks further fenced into 12-cell hubs (Figure 1). Cattle in the rotational paddocks are moved every Monday, Wednesday and Friday, completing one rotation every 28 days.

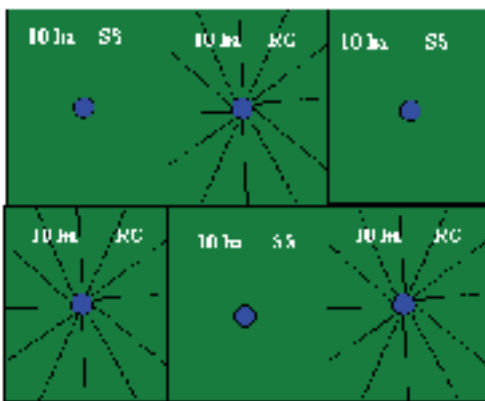


Figure 1: Layout of the 60 ha perennial pasture paddocks; set stocked (SS) and rotational grazing (RG), with three replicates of each.

Cattle were introduced into the trial in August at a stocking rate of 10 DSE (average liveweight of 190 kg). They are weighed fortnightly and to date have put on an average of 1.12 kg/head/day, with no difference in liveweight between the cattle in the rotation and set stocked paddocks (Figure 2).

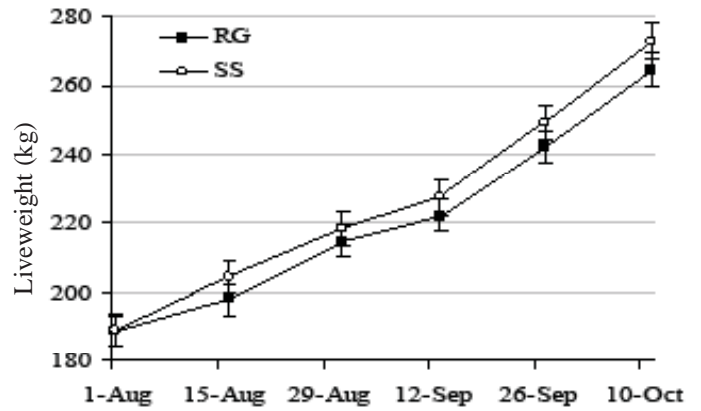


Figure 2: Liveweight of cattle grazing under rotational (RG) or set stocked (SS) grazing regimes over time (\pm SE).

Average food on offer (FOO) at the beginning of the trial was 1000 kg DM/ha for both treatment groups. The rotational grazing system produced more FOO throughout the season, with a difference of over 1000 kg DM/ha between the two treatment groups in mid October (Figure 3). Samples of annual and perennial species in each paddock are taken fortnightly to provide additional data on pasture regrowth, composition as well as quality. These results are yet to be processed.

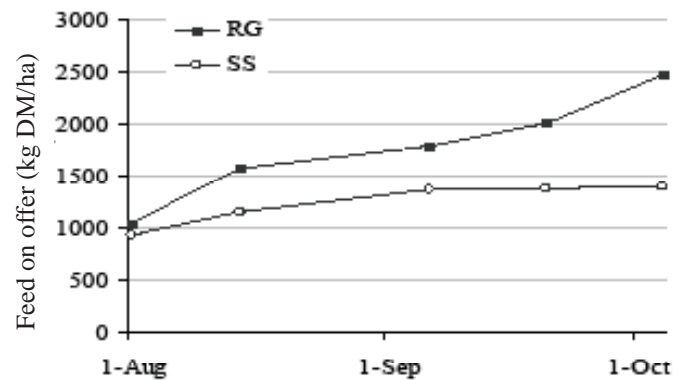


Figure 3: Available food on offer (kg/DM.ha) over time under rotational (RG) and set stocked (SS) grazing regimes.

These preliminary results suggest that perennial grass pastures produce more FOO under rotational grazing than set stocked, without compromising liveweight gain in cattle. Cattle will remain in the trial until FOO falls below the level required to maintain dry cattle (estimated FOO < 800 kg DM/ha), however summer rain may allow us to opportunistically graze these paddocks until the break of the season next year. At this time they will be replaced with a new mob of cattle, where the stocking rate will then be adjusted to match feed supply with animal demand. Based on research in annuals, it is expected that the rotationally grazed paddocks may have the potential to support up to twice as many cattle as the set stocked paddocks.

Perennials in a drought

Tim Wiley, Department of Agriculture & Food, Geraldton, Ph (08) 9956 8518

The 2006 season has been the worst ever recorded in the Geraldton region. While most areas received some rain in the February – March period, the break of the season did not occur until the end of July. Most farmers north of Geraldton received less than 100 mm of winter and spring rainfall. The annual pasture germination was very thin and total feed production for the season was only about ¼ of normal.

Many farms are now totally destocked. Those farmers with paddocks of perennials have also had to reduce stock numbers, but they did make large savings in hand feeding costs in early winter.

Annual legumes either failed to germinate or died as seedlings this year. Most pastures ended up being dominated by annual grasses. Even the broad leaf weeds like cape weed and double gees have struggled this season. Wild radish in crops has grown well despite the drought. Several farmers grazed their crops rather than spray the radish out. They found that sheep were selectively grazing out the radish and leaving the crop (both with white lupins and wheat). The Department of Agriculture & Food and CSIRO are submitting a research proposal to further investigate using sheep for in crop, selective weed control.

While crops and annual pastures have been an almost total failure, perennial pastures have shown their value in drought conditions. Measurements from paddocks and trials of perennial grasses showed there was 20 kg/ha Dry Matter grown for each millimetre of autumn rain. This meant that the perennial grasses were producing about 0.5 ton/ha of feed for autumn. This feed was particularly valuable given the very late break to the season. Hay prices in the Geraldton region reached up to \$300 /ton in early winter.

Tagasaste also made a very valuable contribution in autumn and early winter. However some paddocks did far better than others. It is likely that patches of tagasaste with poor growth were the result of there being shallow soils. On the deeper sands the tagasaste actually grew better than normal in winter as the temperatures were higher than normal.

Lucerne also stood out in trials this winter. Lucerne plots were green when most paddocks were still bare. Michele Allen from east Binu reports that Lucerne sown in 2004 has been the most productive pasture on their farm.

The drought is now starting to affect the growth of the perennials. Normally we would expect the best growth in late spring / early summer after the annuals have died off. While



Mark Johnson, east Ogilvie. Mix of perennials sown in spring 2004 on yellow sand with shallow water table (potential salinity). Gatton panic and Signal grass are dominating with some Rhodes grass present. In another area Tall wheat grass and Lucerne are growing well but at lower densities.

the perennials are still growing at the moment it is well below a normal season. It seems that the soils are now much drier than normal. To get good production out of the perennials will require some rain over this summer. Even with modest summer growth the perennials will at least protect the soil from erosion. Many paddocks of annuals in the north have been blowing since June and erosion will be a serious problem this summer.

The performance of perennials early in the season encouraged many farmers to sow more perennials this spring. Despite the drought they had a remarkably good strike. What little rain they had was conserved by spraying out the annuals in late winter. Light rains in spring (10 - 15 mm events) were enough to get the seed to germinate where farmers had used a furrow sowing method. Seeding conventionally into non wetting surface soil has failed this season.

There were several paddocks where sand was blown back into the furrows after seeding. This meant that the small grass seeds (e.g. Rhodes grass) were too deep and did not germinate. However the Signal grass did germinate from depth so that the blown areas will still have perennial cover. These examples show the benefits of retaining some Signal grass in the seed mix. The other learning was that it is best to have as much annual pasture as possible before spraying to leave plenty of ground cover on soils prone to erosion.

New warm season grasses for southern Australia

Geoff Moore & John Titterington, DAFWA, Ph: (08) 9368 3293.



Bunch grass row trial at Badgingarra RS (13 October 06)

All current varieties of sub-tropical perennial grasses grown in WA were developed for sub-tropical or tropical environments in eastern Australia. The soils and climate in areas like south-east Queensland are very different to those in WA, so what is the potential for varieties specifically selected for our environment in WA? This is the question being asked in the MLA-Salinity CRC warm season grass improvement project.

The aim is to develop 'elite' lines with improved persistence, higher out-of-season production and feed quality when compared with the best current commercial varieties.

The project commenced in December 2003 with no germplasm, but a collaborative arrangement with Queensland DPI has proved very successful. Seed of species considered to have potential in southern Australia was obtained from the Australian Tropical Forages Genetic Resource Centre (Biloela, Queensland) and then bulked up at Walkamin Research Station on the Atherton Tablelands with the assistance of Dr Kendrick Cox (QDPI).

The first seed reached WA in September 2004 and was promptly planted. The two main types of trials established in 2004 and 2005 were row trials of (a) Rhodes grass lines and (b) a range of bunch grasses (species include *Panicum maximum*, *Digitaria erianta*, *D. milaniana*, *Urochloa mosambicensis*, *Paspalum* spp., *Panicum coloratum*). To date ~120 new lines of grasses have been evaluated in the field in WA. All the germplasm is passed by WAQIS before it enters WA to minimise the risk of introducing a weedy species.

The two main breeding sites are located at Badgingarra Research Station and Wellstead (B. Dixon). There are also comparable sites in northern New South Wales.

Key results to date

A number of promising accessions of panic grass (*Panicum maximum*) have been identified from the row trials at

Badgingarra and Wellstead. These accessions show excellent persistence through both hot, dry summers and cool winters and excellent biomass production in the target environments of WA. The promising lines are known as: Pan_max_011, 045, 049, 050, 055, 057, 059, 062 and 067.

The promising accessions have superior dry matter production following summer rain and also in spring when compared with the control varieties, Gatton panic and Green panic (Table 1). Both the promising accessions and the controls have shown excellent persistence in the target environments and very good dry matter digestibility. The feed quality results obtained in summer and autumn 2006 show that the panic grasses will be suitable for growing stock with the dry matter digestibility consistently between 65-70%.

However there is still some work to do before a new panic grass variety can be released. It needs to demonstrate:

- good persistence and productivity under grazing (grazing trial planned for 2007/08)
- very good seed production potential (plan to evaluate seed production potential at Medina Research Station in 2007/08)
- wide adaptation in WA and eastern Australia (3 new trials established in spring 2006 at Irwin, Buntine and Muresk to evaluate the promising lines under a wider range of conditions. Hopefully seed will be available in 2007 for evaluation by collaborators in eastern Australia).

For further information contact: Geoff Moore (DAFWA) on (08) 9368 3293 or gmoore@agric.wa.gov.au

Table 1. Biomass production (g DM/ m row) of promising panic grasses (*Panicum maximum*) versus control varieties (**bold**) in the Badgingarra bunch grass row trials.

Accession / Variety	Av Biomass 21 Nov 05	Av Biomass Feb 15 06	Av Biomass Oct 12 06
Pan_max_059	130	132	85
Pan_max_057	116	110	70
Pan_max_011	99	109	87
Pan_max_055	76	104	81
Pan_max_050	133	103	72
Pan_max_049	120	100	71
Green panic	67	72	70
Gatton panic	41	59	66

Puccinellia grows on saltland due to high waterlogging tolerance

Sommer Jenkins, UWA PhD student, Email: jenkis02@tartarus.uwa.edu.au.

For years there has been a rumour that puccinellia is more salt tolerant than tall wheat grass. However this may just be an old wives tale.

I have spent the last four years of my PhD researching this question, working with Ed Barrett-Lennard and Zed Rengel in conjunction with the Co-operative Research Centre (CRC) for Plant-based Management of Dryland Salinity.

Pasture grasses are commonly sown on saline land in the higher rainfall areas of WA to increase water use, revegetate bare land and for use as fodder for livestock. Puccinellia and tall wheat grass are often sown together as mixtures, but they rarely grow in precisely the same places.

For the last two years, farmer Peter Macleay has generously allowed me access to his 570 ha farm just out of Kojonup. On his property there is a 4 hectare low-lying area affected by secondary salinity, which Peter planted to puccinellia and tall wheat grass about 15 years ago. Peter initially planted the area to increase water use and because it was too severely affected to grow trees. However, the value of the stand subsequently became clearer.

“I did not start to use the stand until about five years later when I had sheep in a feed lot over the break of the season, noticed the tall wheat grass, and decided it was worth a graze”, he said. “Since then I have realised the potential of the perennial grasses and the grazing that they need. There is a synergy with cropping in that the grasses love the areas that crops don’t grow well in.”

What I found

My field studies at Peter’s place showed that the differences in ecological zonation between puccinellia and tall wheat grass were clearly associated with salinity and water-table depth, with puccinellia colonising the lower more severely affected zones of the landscape and tall wheat grass occupying the higher less affected zones. However, in the field these two factors were confounded – salty areas were also more waterlogged. Glasshouse studies were required to separate out the effects of these stresses.

Puccinellia and tall wheat grass plants were grown in a glasshouse at 0, 100, 200, 400 or 600 mM NaCl in free-draining tubes filled with sand. Under drained conditions, puccinellia and tall wheat grass had similar growth responses against this range of salt treatments.

However, it became clear that puccinellia behaved very differently to tall wheat grass when the plants were exposed to



Saline waterlogged area of Peter Macleay’s farm in Kojonup, showing tall wheat grass (rear) and puccinellia (front)

salt and waterlogging. Puccinellia and tall wheat grass plants were grown in the glasshouse at 0, 100, 200 or 250 mM NaCl in free-draining or waterlogged tubes. Puccinellia actually grew *better* under saline waterlogged conditions, whereas growth of tall wheat grass was reduced.

So, what causes these astonishing differences in growth? For a species to grow well in a saline environment, one strategy is to maintain a low level of sodium (Na^+) within roots and shoots. Puccinellia had a far greater ability to maintain relatively low concentrations of sodium in shoots under saline/waterlogged conditions than tall wheat grass.

Closer examination of root anatomy showed that puccinellia had three important adaptive traits that enabled it to grow in saline waterlogged conditions. These were:

- The formation of aerenchyma (hollow channels in the roots that enable oxygen to diffuse down the inside of the root from the shoot),
- The formation of a barrier to radial oxygen loss (which decreases the rate at which oxygen leaks out of the aerenchyma into the surrounding soil),
- Arrangement of root cells in a way that gas filled spaces between the cells are maximised.

I believe that these studies should help in targeting plants to the saline landscapes where they will grow best. In addition, puccinellia is clearly a special plant. It may be worth while examining this species further to identify genes that could be transferred into crop plants to convey higher salt and waterlogging tolerance.

EverGraze - the first challenging year

Paul Sanford, DAFWA, Albany, Ph: (08) 9892 8475.

Future livestock systems will undoubtedly contain a higher proportion of perennial pastures. However it is essential that these systems meet the needs of producers in terms of economic returns and natural resource management. EverGraze is a national research project with the aim of developing perennial based systems that increase livestock profit while decreasing groundwater recharge.

In WA, EverGraze is demonstrating a 60 ha prime lamb production system based entirely on perennials, investigating ways to increase reproductive efficiency in Merinos using perennials and trialling combinations of summer-active perennials and winter-active species to develop pastures that are productive in summer and winter. This article provides a preliminary report on progress with the first two activities.

Prime lamb production system

Following the successful establishment of kikuyu, lucerne, tall fescue, chicory and setaria/panic pastures in spring 2005, Merinotech ewes were delivered to the Wellstead demonstration in February 2006 and joined to Poll Dorset rams in March. The stocking rate is 6.5 ewes/ha or if averaged over the year 12 DSE/ha.

Scanning revealed 67% of ewes were bearing twins, 30% singles and 3% dry for a potential lambing% of 165%. While the actual lambing% is unknown the weaning% recorded in November was just under 120%. Post mortems of lambs revealed most died as a consequence of either birthing difficulties or mismothering. Due to the dry season and lack of feed, lambs were weaned out of the demonstration in November to be finished at Esperance Downs Research Station on perennials. At weaning, single lambs averaged 28 kg liveweight, twins 24 kg.

A supplement in the form of pellets and lupins was fed to all ewes in April and May and just the twin bearing ewes in August and September. Total for this period was 38 kg/DSE. Feeding re-commenced in the second week of November. Our targets for this year were 104% weaning, a maximum of 13 kg of grain supplement per DSE and finishing the lambs on pasture and on-site at 45 kg liveweight. While the economic analysis for 2006 will not be done until early next year it's likely our profit will be less than our target of \$104/ha.

From January to October the site only received 278 mm, 154 mm down on the long-term average for that period of 432 mm with most months receiving below average rainfall. Pasture availability reflected the lack of soil moisture and pastures

rarely exceeded 1400 kg DM/ha and the normally reliable spring flush did not eventuate. Competition for moisture was intense with subterranean clover competing poorly against the perennials. Pasture growth rates were between 15 and 30 kg DM/ha/day for most of the growing season with a high of 50 kg DM/ha/day recorded in early spring. Once the pasture growth rates from an adjoining annual pasture are summarised it will be interesting to see how the perennials performed in comparison.

Intensive short-term rotational grazing was adopted for the lucerne, tall fescue and chicory pastures for most of the year. Typically, paddocks were grazed between 1 and 3 days depending on pasture availability at between 100 and 400 DSE/ha. Perennial persistence under this grazing regime has been very successful. Kikuyu pastures were also included in the rotation however once feed availability was low the kikuyu pastures were set stocked and the lucerne, tall fescue and chicory rested. Without kikuyu as part of the system it is likely we would have compromised the persistence of the other perennials.

While this year has been challenging it has provided us with an opportunity to understand how the system performs in a dry year. We have finished the season with excellent perennial plant density and with ewes in good condition. However, unless we receive summer rain, we will be feeding ewes for most of summer.

Improving reproductive performance in Merinos using perennials

The aim of this trial is to investigate the effects of grazing green kikuyu pastures on Merino ovulation rates in February/March compared to dry subterranean based pasture with and without lupins. The first year showed that the main factor influencing ovulation was liveweight and to a lesser degree condition score, with the annual pastures recording a slightly higher ovulation rate possibly due to a pasture germination that occurred during the experiment. The trial will be repeated in 2007 with an additional treatment of kikuyu plus lupins. Interestingly preliminary data from an EverGraze trial in Wagga NSW has suggested that lucerne may increase ovulation rates in Merinos.

EverGraze is funded by the CRC for Plant-Based Management of Dryland Salinity, Meat and Livestock Australia and Australian Wool Innovation.

On the Road with the Tag Man

Brad Leeson, Tagasaste Seeding Specialists, Lancelin, Ph: (08) 9655 2093



Well...What more can you say about this season, (that will get past the censors anyway!!). It's a shocker, isn't it!!!

However, it is during times of adversity like this that we hopefully can learn some lessons for the future.

I have to say that in my travels around the Northern Ag Region the main statement that I get from our clients is "If it wasn't for our Tagasaste this year we'd be totally stuffed!" or something like that!!

Unfortunately, sometimes it takes a crisis like this for some things to become clear. I think what has become clear is that Tagasaste can survive, and grow (albeit slower than normal) in a drought season.

We did a bit of a ring around a number of our clients that are farming in different areas in the NAR, and following is a short "grab" of what they had to say about their Tag:

One of these farmers lives north of Geraldton, and by early July 2006 had received only 35mm of rain since Oct 2005. He tells us that his sheep, which had access to all the normal pastures on the farm, have either been agisted off, or sold. The cattle however, have been on the Tag all summer, and are still looking OK. His comment was that the cattle have been grazing over summer on land that in the past wouldn't have been stocked at all!

Another farmer east of Dongara also supported the idea that Tagasaste had been very valuable this drought year. Actually he said it more like "If I didn't have the Tag and Perennials I'd be up s..t creek without a paddle!"

I guess you get the picture. His thoughts were that his more recent plantings of Tag had fared better than his older plantations because the rows were a bit further apart.

This is something we have certainly recognised in the industry. How far apart we need to put the rows is still open to debate, but certainly we need to evaluate rainfall, soil type and availability of sub surface moisture when planning our Tag plantation inter-row widths.

The third farmer, even further east, who has over 350 ha of established Tag, has continued to run his breeding herd of cows and calves year round with only a supplement of hay

about once a week over the autumn period. This farmer, like all the others mentioned in this article, has maintained a regular trimming program to keep the Tag under control, and promote fresh growth.

The final farmer that I spoke to for this article, farms out east of Goomalling and was blessed with a fair fall of summer rain, which really kicked his Tag along over the Summer/Autumn period. They are developing a large cattle enterprise in an area that has been traditional wheat/sheep in the past. His comment was that the Tag has got their animals through this season so far, as there has been very little annual pasture.

They did get some frost damage to some of the Tag in late June, which was a bit of a pain, as the Tag was looking particularly inviting, but it is recovering. They also tissue tested their Tag and found good levels of Phosphorous from past strong levels of fertilizing, and so have decided not to apply super this season. (I guess the lesson from this is that if you have a good super history, then when these adverse years do occur, at least you have a super bank to fall back on...for a short time anyway).

The other comment he made was that "It was the poor country on the farm that was getting the stock through this year!"

OK...so you might say that I'm biased, and so might all these farmers, but I think this season must make us all question our past reliance on an annual-based pasture system to provide all our stockfeed.

I'm not saying that Tagasaste is a panacea for all those stock feed problems, but I do believe that where the soil type is suitable, then it makes a lot of sense to have Tagasaste as PART of your pasture system.

One final comment would be that in all my travels around the NAR, I have noticed that it is the farmers who are prepared to spend some money on fertilizer, fencing, water and Tag Trimming, that are getting the best results from their plantations. We can't expect to plant this shrub on our very worst sands, limit the amount of fertilizer that we give it, and then allow it to over-grow, and still expect it to provide our animals with a quality feed source!

And that's enough from me for now. Good luck with the rain!

Brad is part of the team at TAGASASTE SEEDING SPECIALISTS (est 1987), and can be contacted at Lancelin on 9655 2093 or 0427 850 283, or try Bob and Anne Wilson on 9655 1055.

Northern Snap Shots - Spring 2006



This is a recently sown plot of the yet-to-be released Gulf Rhodes grass at Graeme Mailey's farm at Marchagee. Gulf was bred by Dr Don Loch and will be marketed by Selected Seeds from Queensland. It has been selected for salt tolerance at both the germination and seedling stage. The dry finish has not helped with establishment, especially on the saltier areas. But this fresher end of the plot is looking great given the conditions. Photo 23 November 2006.



Tall Wheat grass has so far been a lot more successful south rather than north of Perth. But that's not to say it won't grow up north. This plot is at a sandplain seep trial site at Marchagee run by Lorinda Hunt from DAFWA. It was sown in early July this year and has established remarkably well given the seasonal conditions. And the locusts have yet to destroy although we know grasshoppers have a liking for TWG... Photo 23 November 2006.



This is one of the modified points used at Badgingarra Research Station this year for furrow sowing perennial grasses. Flat plates were welded on to existing 8" sweep points, helping to move the top non-wetting soil sideways, which greatly enhanced furrow development. It was noted that angling the plate slightly forwards trapped a small amount of sand near the weld, significantly reducing wear on the plate. The tyne spacing was 18 inches. A knife point followed each sweep point to tickle up the bottom of the furrow before seed was dropped in and firmed in by a following press wheel. Photo Don Telfer.



A successful strike of sub-tropical perennial grasses at Badgingarra Research Station as a result of using modified points. The paddock was sown to Evergreen Mix on 12 September 2006. Operating speed was between 7 and 8.5 km/hr. This is an excellent strike given the late sowing and early finish. It is great to see such innovation at work in overcoming non-wetting top soil at establishment. Photo Don Telfer early October.