EverGraze
More livestock from perennials

More perennials
Better livestock
Healthier catchments

Case Study

Kikuyu for feed & control of wind erosion

Erica and Phil farm a property 25-30kms north east of Esperance on typical sand plain soils.

They host an EverGraze Supporting Site which has a variety of annual pastures and crops on the property and a mix of sheep and cattle.

The property had a paddock of kikuyu that had been sown in 2003 by Erica's parents. After the positive experience gained in this paddock, Erica and Phil decided to plant more kikuyu. They had found the kikyuy responded well to summer rainfall and reduced the need for supplementary feeding when other feed was in short supply. This resulted in them being able to turn off animal quicker as well as reducing wind erosion on the lighter paddocks. There is now about 250ha established.

Establishment method:

To establish kikuyu, the paddock was sprayed with a double knock using initially 1.5 L/ha of roundup in preparation for a September plant. This was then followed up one month later by 1 L/ha of spray seed. The paddock was then planted with 1 kg/ha of kikuyu (Whittet). Alpha-cypermethrin was used post establishment for wingless grasshopper control.

The paddock was fertilised with super potash 3:1 at 125kg/ha at planting. This was followed up the next year with 100kg/ha of super phosphate and 60kg/ha of sulphate of ammonia.

The aims for establishing the kikuyu were to provide more out season feed and stabilise the paddock. The kikuyu was able to provide both of these however the story was not that simple.

As can be seen the kikuyu was providing a significantly higher DSE throughout 2008 (29.5%) and 2009 (24.5%) and has shown similar results to date for 2010. In particular in the summer/ autumn period of 2008 and 2010 the kikuyu had significantly higher stocking rates than the annual paddocks (Table 1 & 2). However, these high summer stocking rates should not be used in isolation as the supplementary feeding required to maintain these stocking rates needs to be considered (Table 3).

The supplementary feeding data for the two paddocks however tells a different story. The kikuyu paddock had significantly more lupins and hay fed out than the annuals over a two and a half year period. Interestingly though this mainly occurred in 2008 with no supplementary feeding on kikuyu in 2009 and only lupins used across an 85 day period starting in April 2010 (Table 3).

As the figures suggest, 2008 was a particularly difficult season with a late break and little early feed. The annual paddocks were starting to become bare and were susceptible to erosion so the kikuyu was essentially used as a feedlot. It was stocked for approximately four and half months with almost all of the feed going on to the kikuyu during this extended period of grazing. This same pattern revealed itself again in 2010.

farm info.

Producer: Phil Cleghorn and Erica Ayers

Location: north east of Esperance, WA

Property size: 1250 ha

Soils: gravelly sand over clay

Enterprises: Mixed farming system, sheep, cattle, cropping

Pastures: kikuyu and annuals

Erica and Phil

key points

- Kikuyu provided a significantly higher DSE and stocking rate when compared with annual pasture.
- A discounted cash flow analysis of the returns from the perennial and annual systems over 10 years has been undertaken.
- Kikuyu helped to provide out of season feed and reduced the threat of wind erosion.

While the supplementary feed is attributed to the kikuyu paddock, the results show how perennials such as kikuyu have a significant role to play in the whole grazing system.

Boundary of kikuyu (left) and annual paddock in April 2010

Kikuyu quadrant

Table 1: Average DSE/ha from 2008 to 2010

	DSE per hectare 2008		DSE per hectare 2009		DSE per ha 2010
	Summer/ autumn	Winter/ spring	Summer/ autumn	Winter/ spring	Summer/ autumn
Kikuyu	17	8.9	9.5	9.8	8.5
Annual	3.7	16.3	7.3	8.2	3.4

Table 2: Average grazing days from 2008 to 2010

	DSE grazing days 2008		DSE grazing days 2009		DSE grazing days 2010
	Summer/ autumn	Winter/ spring	Summer/ autumn	Winter/ spring	Summer/ autumn
Kikuyu	3113	1630	1732	1775	1554
Annual	678	2991	1333	1339	623

Table 3: Supplementary feeding for kikuyu and annual paddock Dec 07 – May 2010

Pasture type	Barley (kg)	Lupins (kg)	Hay rolls (kg)
Kikuyu	6900	24,895	21,750
Annuals	14,675	960	20,000

Table 4: Pasture condition and persistence

Pasture	Year	% ground cover	% green	% legume	% kikuyu
Kikuyu	2008	100	89	18	100
Annual		94	72	15	
Kikuyu	2009	100	88	3	
Annual		86	50	23	
Kikuyu	2010	100	73	22	98
Annual		83	42	2	

Table 5: Cost of establishment of kikuyu at Esperance

Item	$/ha
Fertiliser	$60
Chemical	$15
Whittet Kikuyu seed	$45
Contract seeding and spraying	$65
Total costs	$185

There are two critical points to remember in this scenario. The supplementary feed attributed to the kikuyu paddock was also feeding animals that would normally have been stocked on the annual paddock and possibly causing erosion. Also some of the annual paddock performance in winter/spring can be attributed to maintaining soil structure during summer by destocking.

Amazingly, despite the heavy stocking rates for the 4.5 month period the kikuyu did not blow and remained stable. The stand was not damaged and in 2009 carried more stock than the annuals with no supplementary feeding (Table 1). 2010 is starting to look similar with the kikuyu carrying higher stocking rates.

2008 really reinforced the value of the kikuyu to Phil and Erica. It helped to provide the out of season feed they were after and stabilised the paddock. It also played a critical role in reducing the impact of adverse seasons on the soil by allowing them to use the paddock as a feedlot without the risk of it blowing, therefore reducing pressure on surrounding paddocks.

Over the three years of monitoring the percentage ground cover in the kikuyu paddock has been maintained at 100% despite heavy stocking rates (Table 4). This has eliminated any risk of potential wind erosion on what was a vulnerable site.

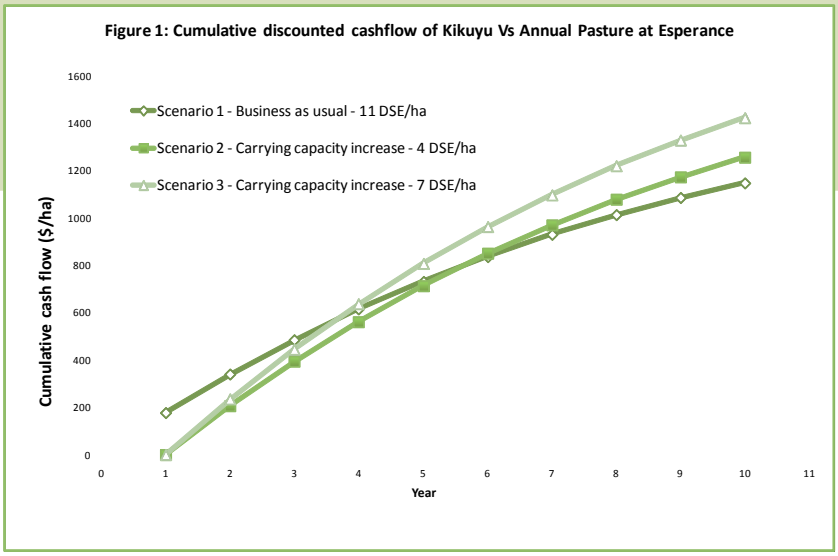
In 2009 the paddock was divided into three cells to facilitate rotational grazing using three electric hot wires which are part of a nine cell rotational grazing system which significantly increases the production and utilization of both the annual and perennial pastures.

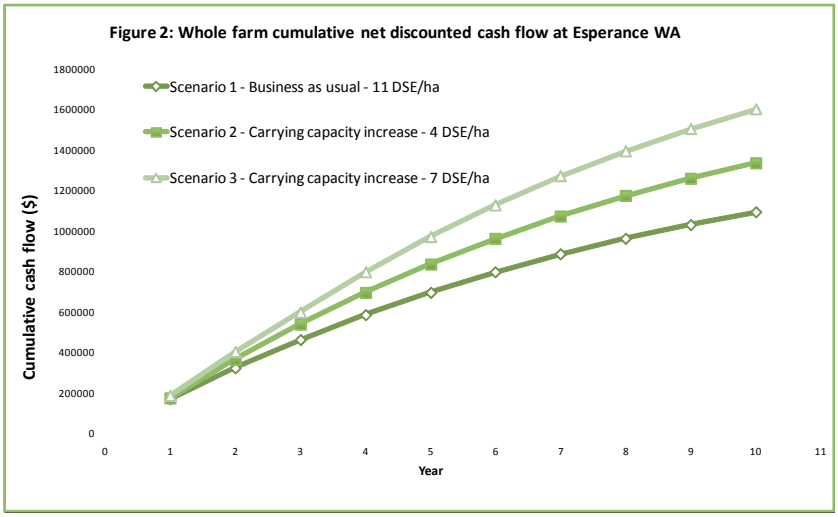
A dip in legume percentage was seen, however this has recovered and is now at a higher level than in 2008.There was also a slight drop in the percentage of kikuyu and percent green that most likely reflects the change in management.

These changes have proven beneficial to the stand. Opening up the kikuyu is of crucial importance to maintaining production in the paddock throughout the year and data appears to be supporting the move to more intensive management, which has benefited the pasture without jeopardising the soil resource base.

Costs and returns;

Establishment costs of perennials at this site were average for plantings in this region. The ability of kikuyu to tolerate low pH (due to previous dominance of annual clover pastures) and marginal soil phosphorus does not necessarily result in high up-front costs. While the seed is expensive (about $45/kg) re-sowing is not likely for 10 years.





The benefits to the Ayres and Cleghorn farm come from being able to run the same breeding stock on less area which allows for further perennial establishment and/or running a cattle trading operation.

A discounted cash flow analysis of the returns from the perennial and annual systems over 10 years has been undertaken with full details of assumptions and the different systems tested shown on page 4. These scenarios were initially undertaken to compare the per hectare establishment cumulative cashflow of the kikuyu with the annual pastures (Figure 1) and then extrapolated across the whole farm (Figure 2). Three scenario's were tested;

- Business as usual (BAU); assumes annual pasture is used with 11 DSE/ha and 5% perennials established in 2003
- Scenario 2; 25% perennials stocked @ 15 DSE/ha (20% under current stocking rates being achieved)
- Scenario 3; 40% perennials stocked @ 18 DSE/ha (stocking rate achieved in 2008-10)

Both the scenario's tested have a positive cash flow on a per hectare basis compared with BAU (Figure 1) after 10 years. Scenario 2 with a lower increase in perennial pasture stocking rate takes five years to break even with BAU. Scenario 3, where the stocking rate is 18 DSE/ha on the perennials (achieved in 2008-09) generates a higher cash flow than BAU after five years. This scenario has a higher total DSE with some of the benefit coming from being able to trade cattle on some of the land. Even with a relatively high up-front cost of establishment for perennials versus annuals, the perennial pastures are able to keep cashflow neutral in year one due to the stocking capacity achieved in the first season after establishment. However, this analysis needs to be considered across the whole farm enterprise to appreciate full impact.

Figure 2 shows a whole farm comparison of BAU as well as the two alternative scenarios. Scenario 3 returns a $508K cash flow surplus over BAU over a 10 year period. Scenario 2 (smaller perennial area) has a smaller cash flow surplus of $244K compared to BAU. The reason for this significant result in both Scenarios 2 & 3 is the ability of the enterprise to keep the same breeding herd on less hectares (due to increased stocking rate of perennials) and trade stock on area that would normally be used for breeding cattle. While these scenario's do not account for labour costs, it is expected that more DSE's could be run per labour unit due to less supplementary feeding with perennial pastures.

Note that the cash flows in this analysis do not take into account environmental benefits such as reduced erosion and salinity. There are also possible benefits from higher per head production from perennial pastures and these have not be factored into the comparisons.

The future

Additional paddocks are planned with approximately 40ha planted a year with the aim of establishing about 40-50% of the farm to kikuyu. They also plan to trial some lucerne in the near future.

Phil and Erica are conducting some fertiliser trials with the aim of better tailoring fertilisers to the kikuyu. They are also experimenting with ProGibb which seems to be giving some good results.

They have over-cropped a paddock of established kikuyu with lupins. This was done partly to clean up some silver grass which has become an issue in recent years and provide a standing crop for some weaner sheep. They used 2 L/ha of spray seed and then used knife blades to seed the lupins. The results have been excellent with good lupin establishment. The kikuyu has already come back and has achieved a very good density despite the effects of a cold winter and herbicide.

Acknowledgement

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Kikuyu

Assumptions and scenarios tested

Financial Model

The financial model used is a 10 year discounted cash flow which incorporates a whole farm approach (cropping and livestock) to the use of perennials. The whole farm approach allows for changes to enterprises mix to be calculated which is important for regions where crop, trading and breeding livestock are options.

Assumptions

The main assumptions used in the model are as follows:

- The base grazing enterprise is a breeder beef operation.
- Perennials are sown in spring so no loss of grazing during establishment is included as a cost.
- Perennial Kikuyu pasture lasts for 10 years.
- A discount rate of 5% is used.
- Annual pastures are stocked to ensure that pastures are not over-grazed.
- Gross Margin $17/DSE for annual pastures and $20/DSE for perennial pastures (based on Holmes & Sackett 2009 Top 20% Beef Breeding Herd producers).
- Trading livestock gross margins $330/ha per annum (based on GM/DSE from Holmes & Sackett 2009 Top 20% Trading Livestock Producers and 11 DSE/ha stocking rate).
- No additional calving percentage or high prices for vealers or numbers of vealers sold. Gains are in stocking rate only (conservative approach).
- Perennial areas are not cropped and are used solely for grazing.
- 1Stocking rate has been calculated in DSE/ha from paddock records of cattle in and out of the perennial and annual pastures. Expressed in Winter Grazed Hectares.
- Fencing and ground preparation have been removed from the up-front establishment cost calculation as these provide long-term benefits and requirements will vary from farm to farm.

Scenario 1 - Business as usual, annual pastures + small perennial pasture area - 11 DSE/ha. Farm runs 11 DSE/ha with 5% perennials established in 2003

Enterprise	% of farm	Area (ha)	Stocking rate DSE/ha	Total DSE
Cattle Trading	0	0	-	-
Annual Pasture	95	950	11	10,450
Perennial Pasture	5	50	11	550
Total	100	1000	11	11,000

Scenario 2 – Carrying capacity increase on perennials - 4 DSE/ha. Farm runs 15 DSE/ha on 25% perennials currently established

Enterprise	% of farm	Area (ha)	Stocking rate DSE/ha	Total DSE
Cattle Trading	9.1	91	11	1,001
Annual Pasture	65.9	659	11	7,249
Perennial Pasture	25.0	250	15	3,750
Total	100	1000	12	12,000

Scenario 3 - Carrying capacity increase on perennials - 7 DSE/ha. Farm runs 18 DSE/ha on 40% perennials as per goals of producer

Enterprise	% of farm	Area (ha)	Stocking rate DSE/ha	Total DSE
Cattle Trading	25.5	255	11	2,805
Annual Pasture	34.5	345	11	3,795
Perennial Pasture	40.0	400	18	7,200
Total	100	1000	13.8	13,800

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