EverGraze
More livestock from perennials

More perennials
Better livestock
Healthier catchments

Case Study

Perennials lift carrying capacity

Barry and Genie Pearce have a property at Woogenellup, 70 kms north of Albany in WA.

They host an EverGraze Supporting Site which is looking at perennials to address salinity and waterlogging whilst also increasing summer forage production.

The farm enterprise includes sheep, cattle and cropping although the dominant enterprise is prime lamb production. The farming system mix is cropping 42%, perennial pastures 19%, annual pastures 33% and trees 6%. The pastures are mainly volunteer annual rye grass and clover based, although Barry has experimented with forage crops, like rape. Barry has an area of tagasaste and another with a combination of kikuyu and tall wheat grass. These perennials combined with the lucerne would make up about 20% of the farm.

Salinity and waterlogging have affected a portion of the farm. Wind erosion on the lighter soils has also been an issue. These combined problems along with a desire to produce more feed out of season led to Barry to trial perennial pastures and shrubs on his property.

Barry has been experimenting with perennial pastures for some time. His first forays were with lucerne and tagasaste and kikuyu on some of his light country, which proved to be quite a success. The tagasaste and kikuyu combination successfully stabilised the light soils and has provided useful feed for his sheep and cattle. This led Barry to think about using other perennials.

The paddock Barry considered had a significant portion affected by waterlogging. This combined with the salinity prevalent in the paddock over the road prompted Barry to look at potential options to use the excess water in the paddock.

farm info.

Producer: Barry and Genie Pearce
Location: Woogenellup, WA
Property size: 558 ha plus 420 ha leased
Soils: gravelly sand over clay
Enterprises: Mixed farming system, sheep, cattle, cropping
Pastures: lucerne, tall fescue, rye grass and clover

He was also keen to try to produce quality out of season feed to allow him to finish his lambs for market. This was a big factor as to why Barry went for lucerne and fescue. Another reason for these two species was that the bottom third of the paddock was affected by waterlogging. Lucerne would use more water in the profile higher up the slope and the fescue would potentially dominate in the wetter parts of the paddock. Thus the decision was made to plant a shot gun mix of lucerne and tall fescue.

Barry and Genie Pearce

Establishment method:

The paddock was sprayed out with a double knock of 1.5 L/ha of glyphosate and then sprayseed at 0.6 L/ha just prior to seeding. Following this, Chlorpyrifos at 250 ml/ha and Cypermethrin at 250 ml/ha was used for insect control. The paddock was sown in August 2006 using K-Hart double disc openers with press wheels and after seeding 100 kg/ha of TEK Phos 2:1 (Super CZM + Muriate of Potash) was spread. The rates of seed used were 4 kg/ha of Stamina GT6 and Cropper 9 Lucerne and 6 kg of Resolute (summer dormant) and Quantum (summer active) tall fescue.

The germination was excellent with a good mix of fescue and lucerne.

key points

- The lucerne carried higher stock rates than the annuals over the entire monitoring period
- The additional feed has been crucial in providing a great finishing system for lambs.
- An additional advantage has been the production of hay from the lucerne paddock.

Managing the fescue and lucerne together however was initially tricky. The lucerne emerged and grew faster and though it needed grazing, it had to be deferred to allow the fescue to establish.

Looking up slope, good growth in the lucerne paddock in 2009

*Table 1: Average DSE/ha from 2008 to 2010 (*Supplementary feed)*

	DSE per hectare 2008		DSE per hectare 2009		DSE per ha 2010
	Winter/ spring	Summer/ autumn	Winter/ spring	Summer/ autumn	Winter/ spring
Lucerne	11.1	7.8	6.9	10.7*	6.6
Annual	6	0	5.2	8.4*	14.5

Table 2: Average grazing days from 2008 to 2010

	DSE grazing days 2008		DSE grazing days 2009		DSE grazing days 2010
	Winter/ spring	Summer/ autumn	Winter/ spring	Summer/ autumn	Winter/ spring
Lucerne	2039	1420	1265	1952*	1202
Annual	1105	0	948	1540*	2647

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

Pasture type	Oats (kg)	Lupins (kg)	Hay (kg)
Lucerne	2633	658	1804
Annuals	968	242	1652

Table 4: Pasture condition and persistence (taken over summer)

Pasture	Year	% ground cover	% green	% legume
Lucerne	2008	100	45	13
Annuals		100	48	19
Lucerne	2009	98	28	28
Annuals		92	30	0
Lucerne	2010	70	65	25
Annuals		93	66	2

Table 5: Cost of establishment of kikuyu at Esperance

Item	$/ha
Fertiliser	$61
Chemical	$15
Lucerne & Tall Fescue seed	$152
Contract seeding and spraying	$64
Total costs	$292

As time went on, the fescue component has declined, most likely due to the dry seasons experienced in 2006, 2007 and 2009. This has resulted in drier then expected profiles and as a result the lucerne has been very competitive and would make up 95% of the perennial component.

The comparison paddock has been cropped in the past and since 2006 was annual pasture. However in September, 2008 Barry trialled 5 kg/ha of forage rape.

Overall the lucerne has performed very well with good stocking rates maintained right through to 2010. The lucerne has carried higher stock rates than the annuals over the entire monitoring period other than the winter/ spring of 2010. This has provided 1638 more DSE grazing days than the annuals (Tables 1 and 2) with almost identical levels of supplementary feeding in the summer/autumn period of 2010.

The additional feed has been crucial in providing a great finishing system for lambs. Barry runs a self replacing Merino flock and the last of the lambs finish on the lucerne. The response of the lucerne to summer rainfall is fantastic. Late spring and summer rains in 2008 and 2009 meant that the animals could not keep up with the lucerne. While the amount of feed is highly weather dependent, the value of quality green feed in summer, even as an addition to grain cannot be underestimated.

An additional advantage has been the production of hay from the lucerne paddock. In 2007 both the annual and perennial paddocks were cut for hay which produced 60 t of hay from the lucerne and 54 t from the annuals. The lucerne was again cut in October 2009 producing an additional 94 t of hay, which meant that the lucerne produced an additional 100 t of hay on top of the usual grazing that was carried out.

The environmental benefits of the lucerne have also been significant. The years have generally been fairly dry since the lucerne has been established which has helped to dry the paddock out. There has however been a significant impact from the lucerne with the bottom of the paddock staying dry even in 2008, which turned out to be a fairly wet year. This would have helped to make a significant impact on the potential salinity in the paddock.

The ground cover on the paddock has also been maintained. Right up to 2010 groundcover has been above 70% which is more than sufficient to control wind erosion. Interestingly this has also been the case in annuals with excellent levels of groundcover, contributed to by the forage rape.

There have been some interesting trends in the percentage of legume/lucerne. This has actually risen and then levelled off over the

period of the trial, which is likely due to the loss of the fescue out of the stand. The lucerne is maintaining good density with 8 plants/m2 (varies from 5-13plants/m2) (Picture 2). Legume percentages have dropped in the annual paddock which is most likely due to the establishment of the rape and do not seem to have recovered (table 4).

Costs and returns;

Establishment costs of perennials at this site were $292/ha which is average for plantings in this region. The inability of lucerne to tolerate low pH and water logging often results in high up-front costs (lime in particular). The seed is relatively expensive (about $12/kg) and re-sowing may be needed in Year 6.

The benefits on the Pearce's farm come from the ability to run the same stock on less area which allows more area to be used for cropping or livestock trading and savings in supplementary feed to finish lambs on the lucerne pastures. Three scenarios have been evaluated and are fully described on page 4;

- Business as usual (BAU); assumes annual pasture is used with 9 DSE/ha, no perennials.
- Scenario 2; 19% perennials running 12.5 DSE/ha
- Scenario 3; 30% perennials running 14.5 DSE/ha

Figure 1 shows the discounted cash flow per hectare of the three different scenarios using the establishment costs inTable 5.

The analysis shows that Scenario 2 breaks even with BAU in Year 4 but then due to re-sowing in year 6 does not break even again until Year 10. Note that with lucerne pastures, it could be expected that the stand will live for up to 10 years but there is variable experience on the longevity of lucerne in this region. Scenario 3 has a cash flow above the current BAU after year 2 and even with re-sowing in Year 6 continues to have a higher cashflow than BAU through to Year 10.

Figure 2 shows a whole farm analysis using the scenarios described. When a similar number of stock are run on a smaller area using perennials (in this case lucerne), it can allow for more cropping on better land or renovation of annual pastures. Both perennial scenarios show a positive cash flow compared with BAU. Increases are $136K and $189K for

Figure 1: Cumulative discounted cashflow of Lucerne Vs Annual Pasture at Woogenellup WA

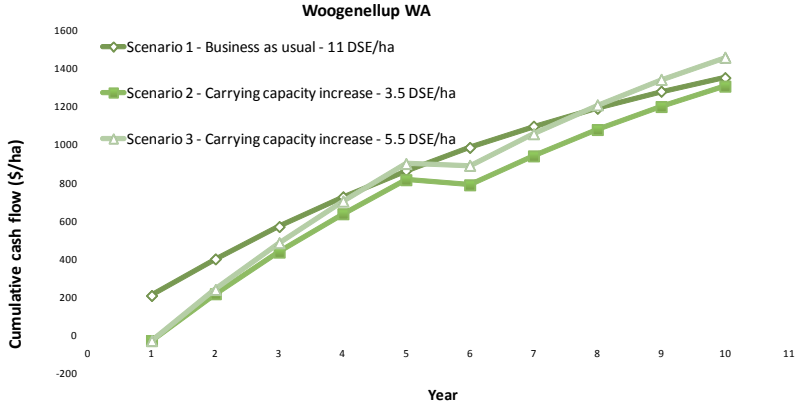
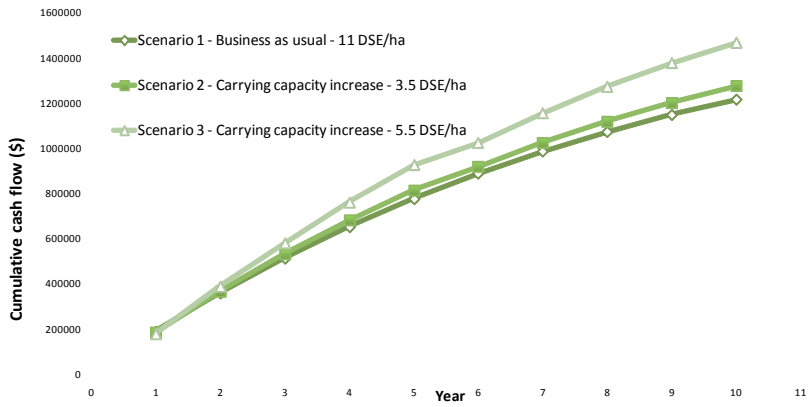


Figure 2: Whole farm cumulative net discounted cash flow at Woogenellup WA



the 19% and 30% perennial systems respectively over the 10 year period. Scenario 3 has also allowed for the purchase of additional stock and is indicative of best practice stocking rate for the region of 10-12 DSE/ha. This scenario is used because the cropping percentage is still at a sustainable level for the region and 30% perennial area is equal to the area that other models in WA suggest is the optimum perennial area.

The future

Barry has been very pleased with his lucerne this time around. It has proven to be hardy and drought tolerant and has provided valuable out of season feed. It has required a move to rotational grazing which has benefited the system allowing the lucerne to persist.

More lucerne and chicory is planned which will provide enough area to really capitalise on the benefits to the animal production. Barry has a small area of kikuyu and is planning to add to the area already established. The kikuyu has shown itself to be a persistent and valuable pasture on light soils that were extremely difficult to manage. More fescue may be trialled in future but this time it would be just the winter active (summer dormant) varieties and would be established without any companion species.

Barry and Genie plan to concentrate more on the animal side of the farm, which has always been the dominant part of their operation. After Barry's experiences, perennials will play an important and ongoing role in this.

Acknowledgement

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Assumptions and scenarios tested

Financial Model

The financial model used is a 10 year discounted cash flow which then incorporates a whole of farm approach (cropping and livestock) to the establishment of perennials. The whole farm approach allows the changes to enterprise mix to be assessed which is important for sustainable crop rotation planning.

Assumptions

The main assumptions used in the model are as follows:

- The farm enterprise has a mix of pastures and cropping.
- Perennial pasture is sown in the spring so there is no loss of grazing the next autumn.
- Perennial Lucerne pasture lasts for 5 years and is then re-sown.
- Annual pastures are stocked to ensure that pastures are not over-grazed.
- Gross Margin per DSE of $20 for annual pastures and $25 for perennial pastures reflecting the decrease in supplementary feed requirements and the current returns in the WA sheep industry. These values include costs of animal husbandry, shearing, pasture management, rams, supplementary feeding and estimated value of wool and sheep sales. Labour costs are not included.
- A discount rate of 5% is used.
- Cropping gross margins are fixed at $350/ha which includes the cost of inputs (seed, fertiliser, chemicals, grain freight, seeding, spraying and harvesting) and returns from grain sales but no cost is allowed for machinery or labour.
- Additional stock are purchased for Scenario 3 @ $50/DSE.
- No additional wool cut for ewes or increases in prices for lambs or lambs weaned. Gains are in stocking rate only.
- Lucerne area is not cropped in this analysis though this may be a future option
- Stocking rate has been calculated in DSE/ha from paddock recordings of sheep movements throughout the year. It is expressed in Winter Grazed Hectares (WGH).
- Fencing and ground preparation are not included as these are life-long costs and requirements will vary from farm to farm.

Scenario 1 - Business as usual - 9 DSE/ha. Farm continues to run 9 DSE/ha with no perennials

Enterprise	% of farm	Area (ha)	Stocking rate DSE/ha	Total DSE
Cropping	41.9	410	-	-
Annual Pasture	51.8	568	9	5112
Perennial Pasture	0	0	0	0
Total	100	978	9	5112

Scenario 2 – Carrying capacity increase on perennials - 3.5 DSE/ha. Farm runs 19% perennial area at 12.5 DSE/ha

Enterprise	% of farm	Area (ha)	Stocking rate DSE/ha	Total DSE
Cropping	49.3	482	-	-
Annual Pasture	31.8	311	9	2799
Perennial Pasture	18.9	185	12.5	2313
Total	100	978	10.3	5112

Scenario 3 - Carrying capacity increase - 5.5 DSE/ha. Farm runs an increased perennial area (30% of arable area) at 14.5 DSE/ha

Enterprise	% of farm	Area (ha)	Stocking rate DSE/ha	Total DSE
Cropping	49.3	482	-	-
Annual Pasture	20.8	203	9	1827
Perennial Pasture	30	293	14.5	4248
Total	100	978	12.2	6075