Trial Report

Incorporation of perennial Australian shrubs into whole-farm management

Project No: IN2.1.011

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1. Executive Summary

This project supported, for the first time, a whole-farm demonstration of an Enrich farming system, which incorporates native perennial shrubs and mixed pasture species. The grazing system was demonstrated at sufficient scale (about 10% of the farm area) to optimise profitability. The project drew upon a decade of research and coupled it with the commercial and production expertise of the host producer, Garry Page. Perennial shrubs and pasture were successfully established and, within 12 months of establishment, contributed positively by reducing supplementary feed costs by about 20% and increasing sheep numbers and production by at least 10%. Costs of adoption were high, approaching $1,400/ha when taking into account the full costs of shrub seedlings, pasture seed, fertiliser, fencing, watering points, earthworks and contracted labour. This is higher than plot-scale trials have indicated because it includes the extra, but real, costs that occur with commercial farming and adoption at scale. Other farming enterprises may not have such high costs, depending on their circumstances, such as fencing requirements and other improvements such as watering points for livestock. However, calculating adoption costs under commercial conditions is critically important information that this project has been able to provide. Importantly, even with high upfront costs, the rate of return in investment was 40%, with a payback period of less than 3 years. Once established, an Enrich forage system is expected to contribute over the longer-term (15-20 years) to whole-farm profitability and to reduced risks associated with poor seasonal conditions and a changing climate.

2. Introduction

Previous work has identified potential benefits to farm profitability and NRM by adding a mixture of Australian perennial shrubs to existing pasture-based livestock systems (Revell *et al.*, 2008; Monjardino *et al.*, 2010; Revell *et al.*, 2013). This mixed forage system of perennial shrubs and inter-row pasture is referred to as the 'Enrich system', as the main findings emerged from the *Enrich* project as part of the Future Farm Industries CRC.

The research suggested that the benefits of an Enrich system include:

- improved whole-farm profit;
- improved groundcover, especially during difficult seasonal conditions;
- improved management of dryland salinity;
- the addition of a predictable feed supply in the autumn 'feed gap';
- flexibility to defer the winter grazing of annual-based pastures;
- reduced supplementary feeding costs;
- gut parasite control, and
- possible improvements in soil carbon.

Farm bio-economic modelling (Monjardino *et al.*, 2010) identified that, to maximise profit and to best complement other enterprises in the whole-farm system, there is an

optimum farm area that should be grown to perennial shrubs. This optimum area varies depending on circumstances of a farm, including the soil types and production systems, but it is typically in the order of 10-15% of the whole farm.

Even with this wealth of information behind us, adoption of Enrich systems is not guaranteed. Critical thinking is required to firstly identify the reasons why the innovation is the 'best' option for a given farm and farming system (i.e. how it fits into a particular farm and its management systems relative to other innovations and technologies); where on the farm perennial shrubs should be established and in what spatial configurations; what shrub species are most suitable and how can they be affordably sourced from nurseries; once established, when and how should the shrub-pasture mix be grazed and; can the expected NRM and economic benefits be confirmed under commercial farming conditions?

The aims of the project were to:

(i) Combine research, farmer experience and farm practicalities to develop a plan for adopting the Enrich system on Garry Page's farm that is realistic and feasible. The plan is to include spatial configurations, shrub and pasture species, and grazing management.

(ii) Trial whole farm adoption and monitor key indicators to quantify the effect of whole-farm adoption on production and profits and identify any unresolved knowledge gaps.

(iii) Extend the results of the trial to other farmers to improve their knowledge and increase the likelihood of wider adoption.

3. Materials and Methods

3.1 Identifying areas of the farm suited to an Enrich forage system

Areas allocated to a mixed shrub-pasture system included

- mildly saline areas - *saline*
- rocky hilltops (shallow soils) - *ridges*
- paddocks unsuitable for cropping but with good quality soil – *good*

These areas are identified in the farm (Figure 1). The majority of the total area was classified as 'good', but increasing forage production on these areas was considered beneficial to the whole-farm system because these areas were expected to yield more forage biomass than the saline areas or ridges, and the distribution of the different land types made it logistically easier for sheep to be placed in an Enrich paddocks at any time of the year.

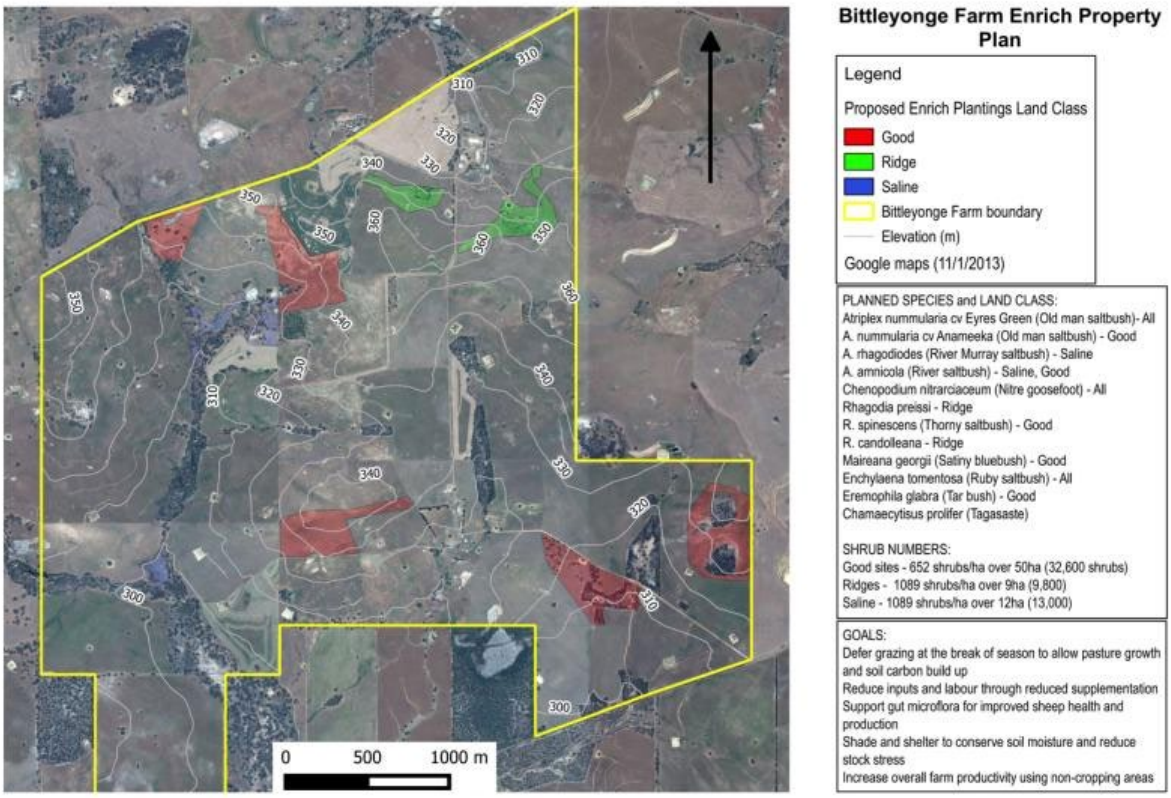

Figure 1. The areas identified on the property as suitable for an Enrich forage system compromising a diverse mix of shrubs and pastures.

3.2 Intended benefits

The Enrich forage system was envisage to provide multiple benefits, which included:

(i) Provision of moderate-high nutritive value forage in summer and autumn when the quality and quality of annual pasture is typically low; i.e., fill a feed gap;
(ii) Reduce supplementary feed costs and labour associated with 'hand feeding';
(iii) Regeneration of areas to improve soil health;
(iv) Increased whole-farm productivity by improving the use of non-cropping areas;
(v) Provision of shade and shelter to conserve soil moisture and improve the microclimate for livestock (i.e., reduce the exposure of livestock to conditions that are outside of their thermoneutral zone).

3.3 Species mix and establishment

A mix of shrub species was planted (Table 1), based on recommendations from the Enrich project and also the commercial availability of shrub seedlings. The different species were deliberately planted randomly at each location rather than in species-specific rows. This was for two reasons: to allow sheep to readily access the diversity, and reduce the risks of poor shrub growth in particular areas due to localised incompatibility between the soil conditions and the shrub species.

Shrub seedlings were planted using a Chatfields tree planter (Figure 2). The paddocks did not receive special management prior to planting, as the planter was able to adequately scalp existing weeds and seeds from the shrub lines. The planting machine ripped to a depth of approximately 20 cm, and the seedlings were placed into the rip-line and held in place with press-wheels. Any mis-planted seedlings were replanted by hand. The rows of shrubs were planted 5m apart, allowing access for pasture establishment and management of the inter-row spaces.

The first batch of shrubs were planted in August 2015, a second batch was planted in October 2016 (delayed due to wet winter conditions) and a third batch in September/October 2017. A total of about 60,000 shrub seedlings have been planted across the farm.

Figure 2. Shrub seedlings being planted with a Chatfields tree planter.

A diverse pasture mix was also established in the inter-row alleys, comprising of: Prima gland clover, Santorini yellow serradella, Margarita French serradella, Bartolo bladder clover, subclover species, medic species, plantain and chicory. All pasture species were direct seeded using conventional methods.

3.4 Grazing management

Grazing of the Enrich forage areas was managed as part of the normal whole-farm decision-making processes. The first grazing after shrub establishment occurred in one location in January 2016, only 5 months from planting. This was a short duration grazing (< 2weeks) and virtually all leaves were removed from the small seedlings However, within 4 weeks, the plants had fully recovered and were well endowed with regrowth foliage, aided by a wet summer (about 70 mm fell during December 2015 and January 2016). Other areas of shrub planting became part of the whole-farm grazing plan within 10-12 months of planting. Most areas have since been grazed twice a year.

3.5 Communication

Four main events were held during the project:

(i) A field day was held on site at Bittleyonge Farm on 23 March 2016 to showcase shrub establishment and discuss the value of Enrich forage systems during the so-called 'out-of-season' months in late summer/early autumn.

(ii) An information session and field walk was presented on 19 April 2017. The field tour at Bittleyonge Farm was preceded by presentations in Pingelly (Figure 3):

a. Dean Revell presented on how to increase profitability and reduce risks with a diverse forage system

b. Ben Cole from Wide Open Agriculture, a start-up company with a focus on regenerative agriculture, outlined their plans for new ventures in the WA wheatbelt (which includes using an Enrich forage system for grazing systems with multiple benefits).

(iii) Seminar presentations to farmers at three locations (Merredin, Williams, Kojonup) to discuss the value of perennial forages, species selections, layout options and adoption issues (26-28 July 2016): High sheep production from low-input forage systems (Figure 3).

Figure 3. The flyers for the seminars and field walk on Enrich forage systems.

(iv) Wagin Woolorama – Garry Page attended the SWCC booth (8-9 March 2018) with examples of shrub and pasture species that he had been growing, and a video presentation of the project. Direct enquiries and questions were fielded over the two-day event.

Table 1. Shrub species used at each of the sites on the farm. The percentage values indicate the approximate proportion of each species at each location.

Site		Classification (G = good; R = ridges, shallower soils; S = slighty saline)	Area (ha)	No.shrubs /ha	Old man saltbush - *Atriplex nummularia* cv. Anameeka	Old man saltbush - *Atriplex nummularia* cv. Eyres Green	River Murray (or silver) saltbush - *Atriplex rhagodioides*	River saltbush - *Atriplex amnicola*	Nitre goosefoot - *Chenopodium nitrariaceum*	Rhagodia preissi	Thorny saltbush *Rhagodia spinescens*	*Rhagodia candolleana*	Satiny bluebush - *Maireana georgii*
1	Half heavy loam, half grey sand	G	8	600	15%	15%		15%	15%		10%		15%
2	Good open country, no waterlogging, mid slope position	G	15	600	30%	10%			15%		20%		15%
3	Ridge top and nearby surrounds	R	10	1089		10%			10%	20%		30%	
4	Ridge top and nearby surrounds	R	6	1089		10%			10%	20%		30%	
5	Good country, medium textured soil/loam	G	15	600	30%			10%	10%		20%		10%
6	Moderate quality,near salt areas	S	3	1089		20%	20%	20%					20%
7a	Possible waterlogging, but reasonable soil	S	7	1089		20%	20%	30%	30%				
7b	Possible waterlogging and moderately saline (filling in existing gaps)	S	10	1005		30%	30%	30%	10%				

4. Results and Discussion

4.1 Forage productivity

Shrub survival exceeded 90% in all areas, and pasture establishment was also successful. Based on visual estimates of edible biomass, feed on offer has been about 3,000-5,000 kg dry matter (DM)/ha in summer/autumn if grazing was deferred during the previous winter, and in excess of 5,000 kg DM/ha if deferred during spring (Figure 4). This level of feed on offer compares to a typical scenario with dry annual pasture or crop stubble providing 1,000-2,000 kg DM/ha in summer/autumn.

In addition to the extra biomass, the perennial shrubs combined with summer active pasture species such as chicory and plantain (Figure 5) provided *green* feed at a time of year where conventional, annual pastures are senesced. Green feed provides more nutrients than senesced pasture, including protein, sulphur and vitamin E, all of which can be limiting sheep production in parts of Western Australia during the drier months. The shrub-pasture mix was highly palatable to sheep, with consumption reducing biomass to 500 kg DM/ha during grazing in summer or autumn (Figure 6).

Figure 4. Shrubs and pasture in April 2017 proving in excess of 3,000 kg DM/ha, with a complementarity between the high fibre, dry pasture and the green, high protein shrubs.

Figure 5. Left: Chicory and plantain in the inter-row in February 2016 less than 6 months from planting. Green 6-month old shrubs are also visible in the left- and right-hand sides of the photo. Right: Inter-row pasture in winter 2016.

Figure 6. Post-grazing biomass in 2016, one year from shrub and pasture establishment.

4.2 Livestock productivity

The provision of extra forage from the Enrich shrub-pasture systems allowed whole-farm stock number to increase by 10%, which represented an extra mob of about 300 sheep. Even with the extra stock numbers, grain feeding over summer and autumn was reduced by 20-25% (from 100-120 tonnes per year to 75-80 tonnes) because animals provided access to the perennial shrub-based paddocks.

When animals were first offered the diverse shrub-pasture mixture, they typically spent the first few weeks consuming mostly pasture, but quickly learnt to incorporate the shrubs into their diet. Upon repeated exposure to the shrub-based paddocks, observations confirmed earlier research findings (Revell et al., 2013) that sheep combine shrub foliage *with* pasture, rather than only eating the shrubs once the pasture is depleted. That is, once sheep (and other livestock species) become familiar with feed diversity, they consume a broader range of plants and increase feed intake. This phenomenon is explained by three complementary mechanisms: (i) metabolic hunger (ii) the satiety hypothesis, and (iii) appetite stimulation (Ginane *et al.*, 2015; Meuret and Provenza, 2015). Metabolic hunger relates to the demand for nutrients from body tissues. As nutrient requirements are met, tissue metabolism increases, which drives

production and intake (see review of Ginane *et al.*, 2015). The satiety hypothesis states that when an animal reaches its capacity to consume a particular feed, it reaches satiety *for that feed*, but it may still have capacity to consume more of another kind of feed *with a different nutrient composition*. Appetite stimulation can occur in livestock in much the same way it does with humans – there is a 'hedonic' pleasure from feed variety that can stimulate appetite and feed intake (Ginane *et al.*, 2015; Meuret and Provenza, 2015).

4.3 Financial benefits and costs

A summary of the main financial benefits that flowed from the provision of the diverse and summer-active forage system is provided in Table 2. The reduction in supplementary feeding and the increase in whole-farm stocking rate are entirely consistent with whole-farm bioeconomic modelling (Monjardino *et al.*, 2010), confirming that predicted benefits can and do occur under commercial farming conditions. In the case of this project, measurable increases in income approached $40,000 p.a. and savings were $6,000.

Additional benefits can also be expected. Although not measured directly in this project, we can expect an increase in wool growth of 8-10% in sheep grazing saltbush-based forage systems (Chadwick et al., 2009) and an increase in wool quality (staple strength) by reducing the risk of tender wool that is often associated with poor quality feed in autumn and rapid changes in feed supply around the break of season (Franklin-McEvoy et al., 2007; Revell 2018). Lamb survival can be expected to be higher if ewes lamb in areas that provide protection (e.g., Robertson *et al.* 2011); depending on weather conditions at the time of lambing, lambing percentage may by increased markedly by reducing lamb deaths due to exposure.

The Enrich forage system also provides an element of risk management because the shrub species are hardy, perennial plants suited to the local environment. They provide a relatively predictable source of nutrients for livestock and a capacity to provide edible biomass during difficult (dry) seasons. An increased level of confidence in being able to manage livestock with reduced reliance on supplementary feeding and lowered risk of negatively impacting on the natural resource base – for example, from overgrazing and exposing bare ground – under different seasonal conditions has a value, but we have not attempted to quantify it in this report.

The direct and indirect costs associated with establishing a diverse shrub-pasture mix are summarised in Table 3. The main expense is the direct cost of seedlings and planting. Indirect costs will vary between different farming enterprises, depending on the requirements for extra fencing, watering points for livestock, and earthworks. Therefore, the simple financial analysis summarised below should be taken as a guide, and modified for different circumstances.

Table 2. Summary of economically important changes to production associated with whole-farm adoption of Enrich forage systems.

Production issue	Change	Unit cost or price	Total value p.a.	Benefit to profitability
Supplementary feeding	Reduced by 25 tonnes	$240/tonne	$6,000	Reduction in cost
Wool production	300 more sheep, each growing 5 kg wool p.a.	$12/kg	$18,000	Increase in income
Lamb production	300 more ewes x 80% lambing rate	$90/head	$21,600	Increase in income
Total			*$45,600*	

Table 3. Summary of direct and indirect costs of establishing a diverse shrub-pasture system.

Cost type	Activity	Comments	Quantity	Total cost
Direct	Shrub seedlings	About $0.50 each depending on species and availability of germplasm	63,000 seedlings	$28,162
	Pasture seed	Diverse mix of pasture seeds		$7,157
	Fertiliser	Liquid and granular		$10,856
Indirect	Fencing	(includes some contractor rates)		$45,143
	Earthworks	Fence line clearing and conservation works		$12,600
	Water troughs			$756
	Soil testing			$3,727
	Wages	Planting shrubs		$3,011
Total				*$111,412*

The return on investment ($45,600 returned for an outlay of $111,412) was 40%, with cost recovery expected within 3 years. This excludes any 'additional' benefits described above (e.g. increased wool strength and lamb survival, improved risk management). The costs above exclude project management costs associated with delivering this project.

4.4 Communication products

SWCC produced an excellent short video with Garry Page (farmer), which is available for viewing on YouTube at https://youtu.be/p1_aV3LegK8, and another video outlining background information based on interviews with Garry Page and with research scientist Dean Revell available at http://www.agtrialsites.com/listing/enrich-mixed-forage-system/ and https://www.youtube.com/watch?time_continue=8&v=XDYZaakZYos.

SWCC also produced a 4-page flyer based on an interview with Garry Page, which is included at the end of this report, and available online via the SWCC website at https://swccnrm.org.au/enriching-pastures-and-profits-with-high-value-forage-shrubs/.

4.5 Climate considerations

The changing climate of south-western Australia is associated with a decline in winter rainfall, an increased likelihood of summer rain, and an increased in maximum temperatures. For example, Bureau of Meteorology data for Pingelly (near Bittleyonge Farm) shows fewer high-rainfall years in the past few decades (Figure 7), but an increase in the number of high rainfall events in January (Figure 8). Combined, the changes in rainfall distribution across each year indicate that since the 1990s there has been an upward trend for an increase in the proportion of annual rainfall that falls in summer (Figure 9).

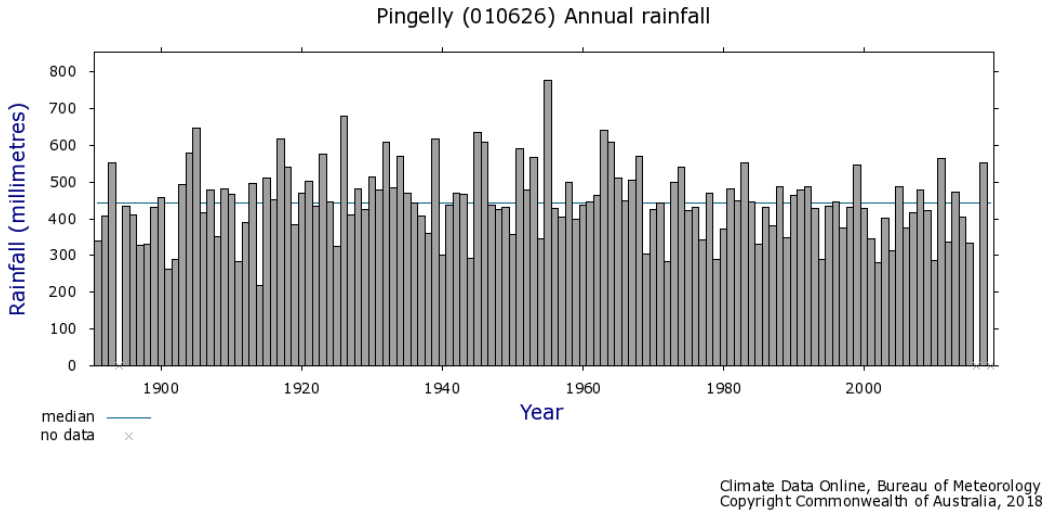

Figure 7. Annual rainfall recorded at Pingelly, Western Australia

http://www.bom.gov.au/jsp/ncc/cdio/weatherData/av?p_display_type=dataFile&p_stn_num=010626&p_nccObsCode=139

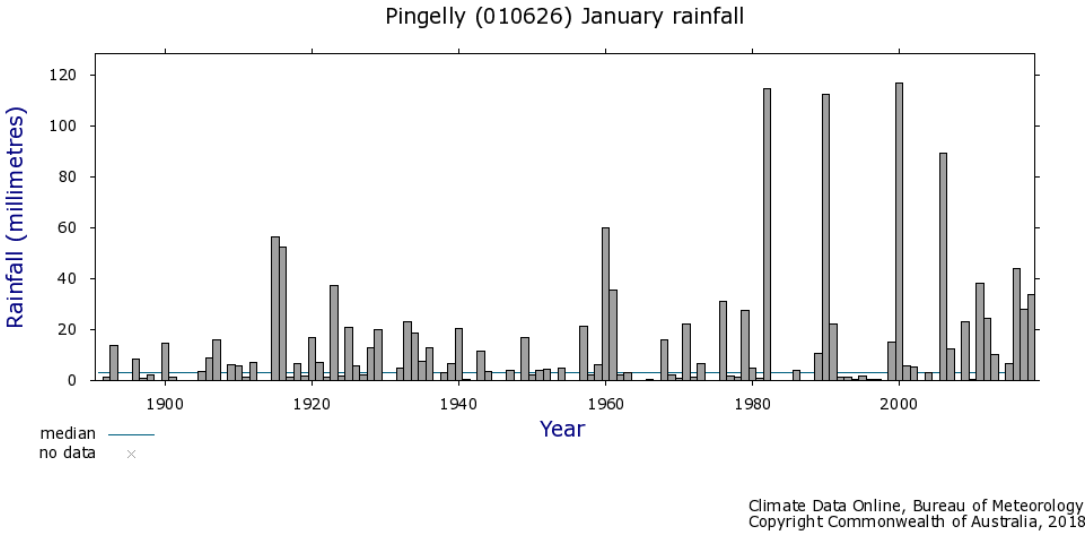

Figure 8. Rainfall in the month of January recorded at Pingelly, Western Australia

http://www.bom.gov.au/jsp/ncc/cdio/weatherData/av?p_display_type=dataFile&p_stn_num=010626&p_nccObsCode=139

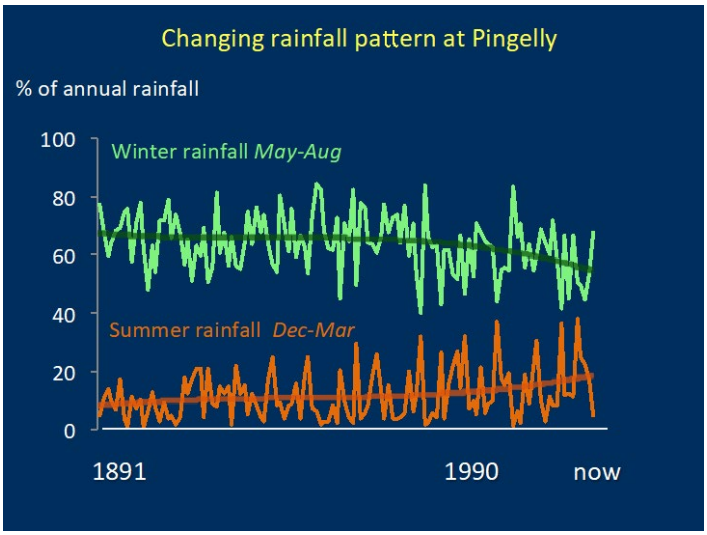

Figure 9. The proportion of annual rainfall that falls in winter (May to August) or summer (December to March). Data sourced from BOM.

The consequences of a changing climate to livestock productivity is a higher risk of poor or delayed establishment of annual pastures due to late breaks-of-season or drier winters. There is also a risk of not optimising the use of summer rainfall events if the feed base does not include summer active species. The diverse mix of summer-active perennial shrubs and a mix of winter- and summer-active pasture species (annual and perennial species) used in this project provide a practical example of a more robust and resilient forage system. Such a system reduces the risks of 'failed seasons' and reduces the reliance on expensive and labour-intensive supplementary feeding to fill feed gaps. In addition, the quality of the animal products can be expected to increase due to an improved year-round provision of nutrients.

5. Conclusions

This project successfully demonstrated the adoption of a diverse forage system that incorporates Australian native shrubs and a mixture of pasture species in the inter-row. It is the first whole-scale demonstration of the 'Enrich' farming system and has supported the research findings that pointed to increased profitability and improved natural resource management. The benefits to production were evident within 12 months of establishing the system, but we expect the benefits to become even more important under expected future climate scenarios.

By demonstrating the planning and activities required to convert research into commercial production, and by sharing the costs and benefits of scaling up to a whole-farm scale, this project has made a major contribution to regenerative agriculture.

The costs of adopting an Enrich forage system at the scale of about 10% of a farm area are significant, and a likely constraint to widespread adoption. This project is important for showcasing practical issues and whole-farm benefits to other producers in way that is not possible in conventional research trials. We suggest this project represents an ideal model whereby extensive research is directly linked to commercial farming practices to 'complete the story'.

Supporting whole-farm projects in partnership with producers willing to share their experiences is, in our opinion, essential for improving adoption rates of innovative farming practices. The start-up company Wide Open Agriculture was motivated by what it saw in this project to commence a 100-hectare demonstration an Enrich grazing system in Buntine, Western Australia. We believe we are at a tipping point with this kind of forage system, where sufficient data and experiences now exist to replace small trials to large proof-of-concept and commercial-scale projects.

6. References

Chadwick, M.A., Vercoe, P.E., Williams, I.H. and Revell D.K. (2009). Programming sheep production on saltbush: adaptation of offspring from ewes that consumed high amounts of salt during pregnancy and early lactation. *Animal Production Science* 49, 311-317.

Franklin-McEvoy, J., Bellotti, W.D., and Revell, D.K. (2007). Supplementary feeding with grain improves the performance of sheep grazing saltbush (*Atriplex nummularia*) in autumn. *Australian Journal of Experimental Agriculture* 47, 912-917.

Ginane, C., Bonnet, M., Revell D.K. (2015) Feeding behaviour in ruminants: a consequence of interactions between a reward system and the regulation of metabolic homeostasis. *Animal Production Science* **55**, 247-260.

Meuret, M. and Provenza, F. D. (2015). When art and science meet: Integrating knowledge of French herders with science of foraging behaviour. *Rangeland Ecology and Management* 68, 1–17.

Monjardino, M., Revell, D. and Pannell, D.J. (2010) The potential contribution of forage shrubs to economic returns and environmental management in Australian dryland agricultural systems. *Agricultural Systems* **103,** 187-197.

Revell, D.K., Durmic, Z., Bennell, M., Sweeney, G.C. and Vercoe, P.E. (2008) The *in situ* use of plant mixtures including native shrubs in Australian grazing systems: the potential to capitalise on plant diversity for livestock health and productivity. *In: Harvesting Knowledge, Pharming Opportunities*, Eds. JF Skaife and PE Vercoe (Cambridge University Press, Cambridge) pp. 36-49.

Revell, D.K., Norman, H.C., Vercoe, P.E., Phillips, N., Toovey, A., Bickell, S., Hughes, S., Emms, J. (2013). Australian perennial shrub species add value to the feedbase of grazing livestock in low-medium rainfall zones. *Animal Production Science* 53, 1221-1230.

Revell, D.K. (2018) Forage for the feed gap – getting high value from marginal land. Project report to Wheatbelt NRM (June 2018).

Robertson, S.M., Friend, M., Broster, J.C., King, B.J. (2011). Survival of twin lambs is increased with shrub belts. *Animal Production Science* 51, 925-938.

Forage shrubs with inter-row pastures on a mixed farm

Interview with farmer Garry Page

Between 2015 and 2017, Pingelly farmer Garry Page planted 10% of his farm with 12 species of forage shrubs and a diverse inter-row pasture. With funding support from South West Catchments Council (SWCC), the aim of the plantings was to increase profits and demonstrate findings from the *Enrich* research project.

Enrich was a nine-year long project funded by the Future farm Industries CRC that assessed the edible biomass, nutritional value, health benefits and grazing preference for 94 Australian native shrub species.

The project concluded that a suitable shrub and inter-row pasture system, applied to 10-25% of a low-medium rainfall mixed farm, could increase whole-farm profits through reduced supplementary feeding, deferred grazing of annual pastures and other benefits such as animal health.

With some plantings now two years old, SWCC spoke to Garry to find out what he has learnt from the project.

How does the future look for a combined shrub and pasture forage system?

Well I think it's tremendous. As time goes by I can't see how I could do without them really. In a tough year like 2017, we've rotated all the mob through there and kept their condition up.

What are the benefits for animal health?

Three or four of the varieties were selected for their anthelmintic attributes to control worms. So, you can rotate sheep through to keep the worms at bay without losing any productivity.

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It reduces the amount of supplementary feeding you need to do.

You can get green feed and vitamin E into young sheep through the summer without having to get them in and top them up. So, it eases management there.

And it's good shade and shelter at lambing or shearing time.

Do you think it's giving you an economic benefit?

It will do. We don't run a feed lot as such or feeders, but we've been able to trail feed and finish cross bred lambs with the shrubs. The reduction in supplementary feeding – we still supplemented them in conjunction with the shrubs – we were able to finish lambs at a much cheaper rate than just supplementary feeding, and we turned them off out of season and got a higher price. So, there's the cost-saving and the extra price that we got. I can't remember the numbers but about 400 sheep, we were able to get about $15,000 back in the first year.

Have you deferred grazing from other paddocks to allow them to bulk up?

Yeah, it's brilliant. In winter and spring time you can lock some paddocks up and when you know you've got enough bulk in there you can put the sheep in there. We had one patch in 2017 stocked at probably 25 DSE (dry sheep equivalents) to the hectare for about 6 weeks while we locked up some pasture paddocks to try and get some bulk growth into them. Those sheep stayed in good forward condition, they didn't go backwards. The shrub paddock was bulked up so you had the chicory, which was like a shrub so there was a lot of feed there and we still gave them supplementary feed – bit of hay and a few pallets trail-fed.

Where did you plant shrubs?

Like most farmers we were reluctant to put them on good land. So, we focussed on patches of a paddock that you don't crop and fenced them off. We selected rocky ridges and South-West slopes that were frost prone and areas where you couldn't get seeding gear into for trees and rocky

Shrubs planted and their traits

(Adapted from: Perennial forage shrubs providing profitable and sustainable grazing: Key practical findings from the *Enrich* project)

Scientific name	Common name	Some highly rated traits
Atriplex amnicola	River saltbush	Edible biomass, regrowth, crude protein, digestibility, mineral content (Ca, Mg, S)
Atriplex nummularia	Old man saltbush	Edible biomass, regrowth, digestibility, mineral content (Ca, Cu, Mg, S, Zn), shelter
Atriplex rhagodiodes	Silver saltbush	Edible biomass, regrowth, crude protein, mineral content (Ca, Cu, Mg, S, Zn), shelter
Chamaecytisus profiler	Tagasaste (exotic)	Palatability, digestibility, calcium, magnesium and zinc content
Chenopodium nitrariaceum	Nitre goosefoot	Crude protein, bioactivity (reducing methane, ammonia and gut parasites), calcium, magnesium and sulphur content
Enchylaena tomentosa	Ruby saltbush	Regrowth, calcium, copper, magnesium, sulphur (also good bioactivity)
Eremophila glabra	Tar bush	Palatability, reduced methane production, calcium and magnesium content
Maireana georgei	Satiny bluebush	Regrowth, crude protein, calcium and sulphur content
Rhagodia candolleana	Sea berry saltbush	Reduced methane production, calcium, magnesium and sulphur content
Rhagodia preissii	Mallee saltbush	Regrowth, calcium, copper, magnesium and sulphur content, digestibility, shelter
Rhagodia spinescens	Thorny saltbush	Crude protein, calcium, magnesium and sulphur content

Notes: 1. Two cultivars of Old man saltbush used (Eyres Green and Anameeka).

This project is supported by the South West Catchments Council, through funding from the Australian Government's National Landcare Program and Government of Western Australia.

outcrops and that sort of thing. We selected areas that were spread out across the farm and accessible by laneways, so at any time of the year you could get in and out of them and we could rotate two or three mobs through each patch.

How have the different species performed?

Pretty much all of them have performed pretty good. I wouldn't say that there were any duds in there. They've all got a purpose and they all survived and with a wet summer we had a good strike rate too.

What are the key tips and tricks for using forage shrubs?

We've waited until there is a good moisture profile to plant them. You've got to be mindful that you plant them early enough so they have enough moisture to get the roots down and established to get through that first summer.

Mixing the varieties up and not sowing individual varieties in a row. We mixed the whole 12 species that we used one for one. It was a bit time consuming, but we did it in the tray so they were all mixed up. I think that has been really beneficial to training the sheep to eat them, they are not selecting one and overgrazing it.

And you've got to have a good bulk inter-row of pasture around it. If you just had shrubs on bare land, you wouldn't get the benefit – the two go hand in hand. It's not just saltbush. You've got to have the bulk of feed to fill them up and keep them satisfied, and then they nibble and selectively graze what they want from the shrubs to get the benefit. Select good pasture varieties that perform in your area.

What pastures have you planted with the shrubs?

We put plantain, chicory, yellow and pink serradella, Santorini and Margurita. We put bladder clover, prima gland clover and a sub clover that suits our rainfall and district. We tried to get some medics too but couldn't source them.

How soon after planting were you able to graze?

We were extremely lucky, with the summer rainfalls. We planted them in late August 2015; we were able to get a light graze in late Autumn 2016. We'd grazed all our patches probably twice by the end of 12 months without any damage.

How have the sheep adapted to the grazing system?

Well most of the time they're looking for extra feed when you put them in there so they've gone in and eaten them straight away. Probably one or two of the Rhagodias in the summer time are a bit slower. They might be a bit bitter at that time of the year. But, if you put enough numbers in there and you graze them long enough, they seem to

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have evenly eaten everything by the time you take them out.

So before you started, you would have had some reservations. How do you feel now? Are you glad you went through with it?

Absolutely. I was relatively confident because we'd had old saltbush plantings from years ago – Old Man River, bluebush, tall bull wheatgrass and puccinellia, but there was no interrow with that. It was basically a bit of reveg on saltland.

I went and worked in the wheatbelt and learnt a fair bit from some old timers that were terrific stockmen that had run high production sheep on basically salt country where it was all saltbush. I could see the benefits of it and I suppose the biggest fear was the investment that we had to spend. We were lucky enough to get a good grant but we sort of spent more than our dollar for dollar, and you are wondering, well I hope it does what we think – and its done all of that so there's no qualms about getting your money back over a reasonably short period of time. The highest part of the cost is in the new fencing and putting water to that paddock and that sort of thing. Yeah, you get it all back.

It's a no brainer once you experienced it. It keeps a more even health profile with your sheep and a more even production cycle. It levels out the troughs. Any good stockman would just about instantly see the benefit of it.

What's the minimum area that you would want allocated to this system on the farm?

I think that is up to the individual environment and how many sheep you run, but the Enrich program reckon 10 -15%. Any more was overkill and any less than 10% you are not going to get the maximum benefit from it.

We aimed at 15% and we would have 15% of the farm fenced off into paddocks but we would only have 10% planted to shrubs.

Has it helped a lot with your flexibility and stress as a farmer?

Yeah, absolutely. For managing animals in a year like 2017 at a high stocking rate, yeah terrific.

For more information, call SWCC on (08) 9724 2400 or visit http://www.agtrialsites.com/listing/enrich-mixed-forage-system/

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