sustainable agriculture

Integrated Native Forage Shrub Systems Fact Sheet: Establishment and Economic Analysis

Above
Sheep grazing on saltbush

Key Messages

- Forage shrubs can provide the energy and protein to 'grow' sheep
- Planting forage shrubs is a great concept on country which is underperforming
- The inter row needs to be maintained with high quality feed sources such as annual legumes or quality grasses

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Introduction

What options do farmers have with underperforming country? Turning this country into productive land has high costs associated with it. Be it soil amelioration or planting to forage shrubs, there are large opportunity costs involved. Should this country remain minimal inputs, minimal return and should this money be spent on more productive land? Forage shrubs once established can provide up to one third of the energy and protein required to grow adult sheep, providing the inter row is also managed correctly. Forage shrubs can reduce supplementary feeding costs as well as the labour costs associated with feeding and monitoring sheep. Forage shrubs will also provide valuable shade and shelter as well as allow farmers greater flexibility for deferring pasture paddocks and potentially increasing cropping area in favourable years.

This fact sheet provides a short introduction on how best to establish integrated native forage shrub systems and describes an economic analysis of incorporating 10-20% of farmland to forage shrubs. This economic study will compare three alternative feeding regimes during a 6 week autumn feed gap period. Feeding regimes (1) Feed lotting (2) Paddock with lick feeders (3) Forage Shrubs.

Economics of Forage Shrubs in Western Australia

This case study will look at the cost of supplementary feeding a flock of 1000 ewes. The following assumptions have been considered.

Assumptions

- **Wheat $350/t**
- **Barley $280/t**
- **Lupins $350/t**
- **Oats $250/t**
- **Pellets $335/t**
- **Straw $100/t**
- **1000 50kg Ewes, 70 days pregnancy.**
- **6 weeks grazing/supplementary feeding.**

Feed lotting

Farmers will always do the sums to determine which ration will be the cheapest to maintain sheep in a feedlot. One ration in one year won't necessarily be the cheapest ration the next. It is important to have a well set up feedlot to ensure livestock do not lose condition. Feed lotting ration will be for 50kg ewes at 70 day of pregnancy. The ration needs to have 9 MJ/kg/day with 15% crude protein.

Table 1. Feed lotting Rations for 1000 ewes for 6 weeks.

Ration	Pellets* (kg/hd/day)	Barley (kg/hd/day)	Lupins (kg/hd/day)	Straw (kg/hd/day)	Value per/hd/week	Total
1	0.8kg/hd/day	-	-	-	$1.88	$11256
2	-		0.65Kg/hd/day	0.10kg/hd/day	$1.66	$9960
3	-	0.5kg/hd/day	0.15kg/hd/day	0.15kg/hd/day	$1.43	$8580

Paddock feeding with Lick Feeders

Confined feeding on stubble paddocks will vary between seasons depending on the stubble loads. Once stubble paddocks are grazed to <50% ground cover livestock should be removed to avoid erosion risk and farmers should resort to lot feeding. The main feed value of stubbles is in the spilt and unharvested grain and weeds they contain. For the purpose of this case study, it will be assumed paddocks have been lightly grazed after harvest and all grain has been removed. All that remains is cereal stubble. Lick feeders will be used as a feeding source. Determining a ration is always hard with lick feeders when sheep have access to cereal stubbles. Sheep will also prefer to graze if there is sufficient feed and energy available in the paddocks before feeding from the lick feeders. This study will assume a 50/50 ratio of grazing the standing stubble and feeding on lick feeders to gain sufficient energy and protein to maintain a 50kg ewe at 70 pregnancy.

Table 2. Lick Feeder Rations for 1000 ewes for 6 weeks

Ration	Pellets* (kg/hd/day)	Barley (kg/hd/day)	Lupins (kg/hd/day)	Straw (kg/hd/day)	Value per/hd/week	Total
1	0.4kg/hd/day	-	-	-	$0.9	$5400
2	-		0.32kg/hd/day		$0.78	$4680
3	-	0.38kg/hd/day			$0.74	$4440

Forage shrubs

Establishing forage shrubs on underperforming, low productive country is a great option for farmers. This is assuming all the correct guidelines are followed during the establishment period. There is a substantial upfront cost of around $5-600/ha to establish forage shrubs. The Enrich Project also highlighted the importance of planting a number of species to create diversity. Providing diversity is the key and it is unrealistic to expect animals to perform well at all times with just one or two shrubs or pasture species. Also the time period to establish forage shrubs, which will ensure the shrubs, can handle and recover from grazing is also substantial. 24 months is needed for light grazing and 36 months for intense grazing. This establishment period also puts pressure on other paddocks on the farm as they have to handle a greater amount of sheep during this establishment period.

Research from the Enrich Project, indicated that shrubs may typically constitute one quarter to one third of the dry matter intake of sheep. Therefore even with shrubs, the bulk of the biomass that fuels animal production will still come from a productive inter row pasture or shrub understorey. A good water source is critical and will increase dry matter intake of sheep. Poor water quality will limit intake and cause sheep to lose condition.

As forage shrubs may only provide one third of the energy requirement, a valuable feed source needs to be grown/established in the inter row. This again is a substantial cost. Grass weeds such as barley and brome grass should be controlled to ensure grazing of this inter row is not compromised. Broadleaf weeds will provide a good feed source, although care should be taken not to let broadleaf weeds dominate. Planting annual legume pastures require at least two years of set seed to maintain their seed bank. The upfront cost of establishing annual legume pasture is $100-150/ha. Oats could also be planted into the inter row and ‘hay frozen’ or let run to seed which would be of similar cost. This would also provide the required energy and protein to growth sheep.

Benefits of established forage shrubs such as shade and shelter is hard to put a dollar value on. Research has shown that shade and shelter can increase lamb survival which increases profitability. This case study also only refers to grazing forage shrubs during the autumn feed gap. Having established forage shrubs allows farmers the flexibility to defer grazing pasture paddocks. This deferring allows pasture paddocks time to ‘get

away' which will carry a greater number of sheep for a longer period through spring. With established forage shrubs, in seasons where there is an early break and good winter rain, farmers could have the option to sow one or two paddocks to crop which were planned for pasture due to the feed available in forage shrubs. This will result in greater productivity, which could turn into greater profitability for the farm in that season.
Forage shrubs also reduce labour cost involved with livestock. Farmers will always check their livestock daily or every second day during this autumn feed gap period. The labour that is saved is the time farmers spend 'mixing up' rations and filling feeders or feed lots. This time is also very hard to put on a value on, however more time equals less stress.
Research from the Enrich Project stated established forage shrubs could carry up to 10 sheep per hectare assuming there was a good quality feed source in the inter row. Therefore farmers would need around 100 hectares of forage shrubs to supply enough energy and protein for a flock of 1000 ewes. This upfront cost would be $50000 which is quiet considerable on underperforming country. Could this money be allocated to land with higher productivity?

Economic Comparison

To determine how long it would take to recover the cost of planting 100 hectares to forage shrubs the following assumptions are made.

(i) 50 hectares shrubs at $1000/ha and 50 hectares $150/ha planting inter row.
(ii) $50/ha management cost of inter row.
(iii) 6 weeks grazing/supplementary feeding.
(iv) Lick feeders $1500, 250 sheep per lickfeeder.

Table 3: Economics. How many years it takes to recover upfront cost of Forage Shrubs.

Feed Regime	Upfront Cost	1st Year Cost	2nd Year Cost	3rd Year Cost	Years to cover cost
Forage Shrubs	$57500	-	$2500 + 8580	$2500 + 8580	-
Feed lotting Ration 1		$11256	$11256	- $11256	7
Feed lotting Ration 3		$8580	$8580	$8580	9
Lick Feeder Ration 1	$6000	$5400	$5400	$5400	7
Lick Feeder Ration 3	$6000	$4440	$4440	$4440	8

Farmers clearly would not seed 100 hectares of forage shrubs in one year. Planting 20 hectares blocks would be achievable and realistic. Planting small blocks each year would spread the upfront cost associated with forage shrubs across the whole farm business. Although the number of years it would take to recover upfront cost of establishing forage shrubs is high, in seasons where there are poor stubbles, higher grain prices and a late break, supplementary feeding costs will increase and therefore the amount of years it will take to recover costs will decrease.

How to establish an integrated native forage shrub system

Design

Belts containing 4 to 6 rows of mixed forage species from ground cover, small to medium shrubs and some larger small to medium trees.

The belts are generally sown on the contour with an inter row space of at least 10m for stock and vehicle movement. The inter row is also important to supply high carbohydrate feed such cereal or dry pasture to compliment the high protein feed available from the forage shrubs. The system design is very flexible and can be modified to meet farm management requirements however it is recommended that block plantings are avoided or restricted to small areas as experience indicates that stock can become difficult to muster in this style of design.

Site and species selection

The system can be implemented on any areas that are currently unproductive or not economic for cropping or are delivering poor annual pasture returns. This includes areas that are becoming saline, prone to spring frost, becoming hydrophobic, effected by wind erosion, areas around rocky outcrops or that are now inaccessible for today's large machinery.

Greening Australia has placed a strong emphasis on using locally adapted Western Australian species with proven forage value. The overall process of shortlisting our trial species list has been guided by screening work conducted by the CSIRO Enrich Project across southern Australia and monitoring work by DAFWA in the rangelands of Southern WA.

Biodiversity is a key component of the system with between 10 to 20 different species included at each site and approximately 10% of the overall mix is small to medium trees and shrubs to provide shade, shelter and habitat.

Establishment

During the initial 3 year trial of the system, direct seeding has been the core establishment method used. Specialised seeding machinery has been developed in cooperation with Dr Geoff Woodall to increase the reliability of this method and bring down the overall establishment costs. A seeding rate of between 200 to 300g per km of row is used with approximately 80% of the weight attributed to *Atriplex* and *Maireana* species which are light and bulky and the remainder being *Acacia, Enchylaena* etc. Bulking agents are used to assist flow through seeding machinery including granulated low P fertiliser, wetting granules and fine vermiculite and clay pellets depending on the seed mix.

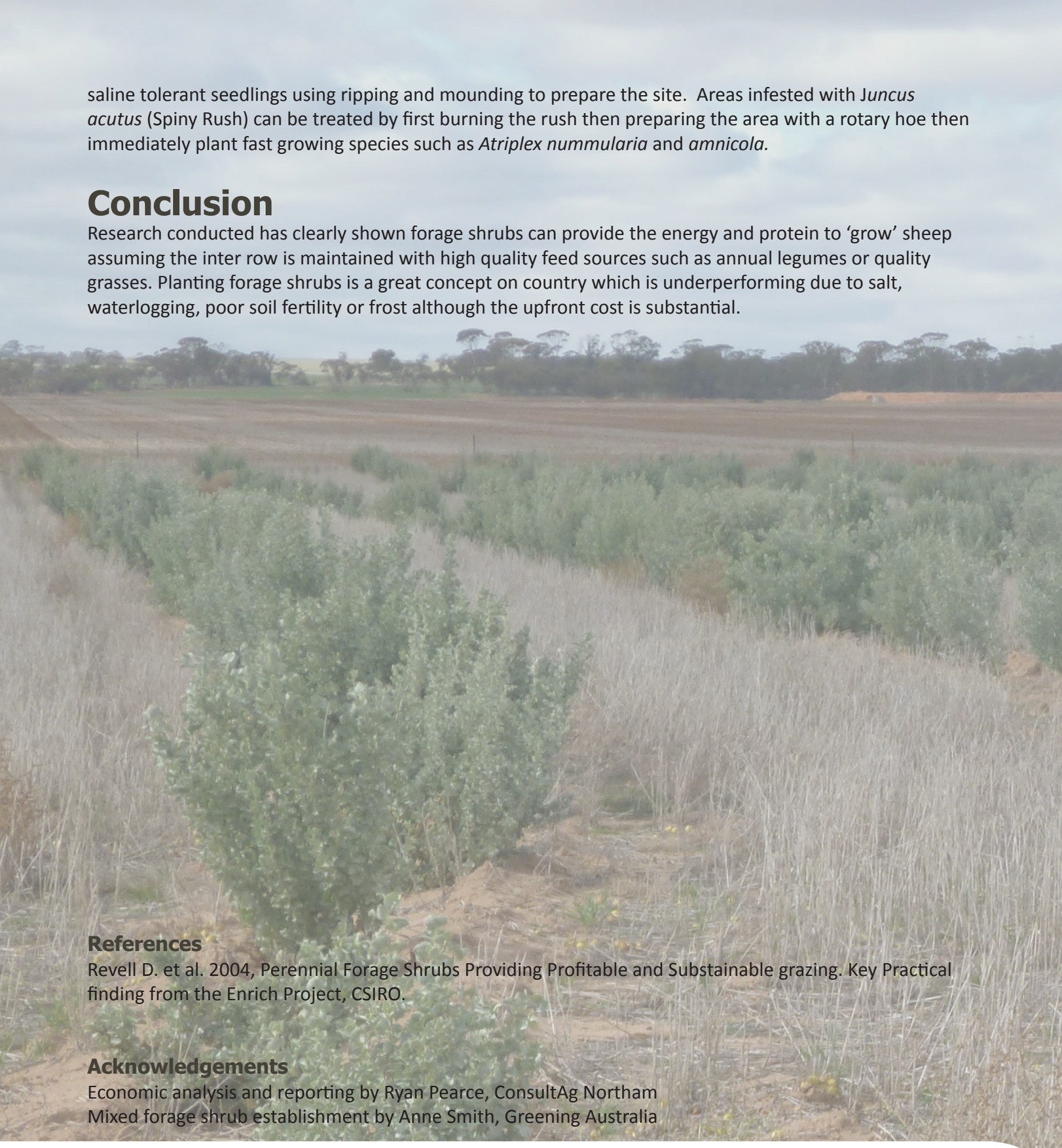
On some trial sites seedlings have been used where commercial quantities of seed are unavailable or expensive. Greening Australia has also conducted propagation trials using cuttings for many of these species and has found that *Rhagodia* and *Atriplex* species strike readily from cuttings whereas *Maireana* and *Enchylaena* have a much lower strike rate.

Also many areas containing portions that are too saline for direct seeding can still be established using

saline tolerant seedlings using ripping and mounding to prepare the site. Areas infested with J*uncus acutus* (Spiny Rush) can be treated by first burning the rush then preparing the area with a rotary hoe then immediately plant fast growing species such as *Atriplex nummularia* and *amnicola.*

Conclusion

Research conducted has clearly shown forage shrubs can provide the energy and protein to 'grow' sheep assuming the inter row is maintained with high quality feed sources such as annual legumes or quality grasses. Planting forage shrubs is a great concept on country which is underperforming due to salt, waterlogging, poor soil fertility or frost although the upfront cost is substantial.



References

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Wheatbelt NRM
269 Fitzgerald St
PO Box 311
Northam WA 6401

Phone: (08) 9670 3100
Fax: (08) 9670 3140
Email: info@wheatbeltnrm.org.au

Australian Government

wheatbelt natural resource management

Greening Australia

ConsultAg Advancing Agriculture