CASE STUDY

of success with saltland pastures #4

Government of South Australia

Department of Water, Land and Biodiversity Conservation

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sustainable grazing on saline lands

productive and sustainable ways to use saltland

SALTBUSH FOR RISK REDUCTION & REGAINING PRODUCTION

Trevor (Ted) Beare & Martin Wilkinson, Snowtown, Northern Agricultural Districts

The salinity issue

Trevor (Ted) Beare and Martin Wilkinson manage and share farm *Maro Creek*, a mixed cereal, sheep and cattle farm between Lochiel and Snowtown in South Australia's Northern Agricultural Districts.

The property extends from The Hummocks (a range of hills to the west) to the naturally salty Lake Bumbunga. This lake is the natural discharge zone for a landlocked and internally draining groundwater system and is annually harvested for salt. So it is not surprising that low-lying land within this system is at risk of salinity when watertables rise.

Around 1992, Ted and Martin recognised there was about 200 ha of low-lying ground, at the time under cropping, which was being impacted by salinity. They were noticing increasing sea barley grass and bare areas, while yields had gone down to the extent that they were losing money. The salt-affected ground would blow in summer, further degrading production potential.

The clearance of native vegetation across the catchment had set in train a new regime of increased drainage past the root zone (which would cause rising watertables many decades following clearing), while big rains in the early 1990s also helped to launch the salinity problem.

Photo: B Munday

For Ted Beare and Martin Wilkinson of Maro Creek, saltbush has regained production from high risk saltland.

Fast facts

Farmer names	Trevor Beare & Martin Wilkinson
Farm location	*Maro Creek*, Snowtown/ Lochiel, Northern Agricultural Districts
Enterprise mix	Cereal cropping, wool, merino lambs, cattle fattening
Saltland pastures	Saltbush, sown medic & volunteer understorey pasture
Rainfall pattern	350-400 mm average
Catchment clearing date(s)	Mostly by the early 1900s
Salinity appearance	Increasing sea barley grass, bare areas and uneconomic crop yields on 200 ha of low-lying ground, following the 'big wet' of the early 1990s
Original vegetation	Mallee scrub, grassy woodlands, chenopod shrublands
Saltland soils	Loamy red-brown earths
Depth to watertable	Within about 1.5m of the surface (in the early 1990s)
Motivations for taking action	Establish a productive & profitable land use in a relatively high salinity risk area Stop the spread of salinity

Given that the degraded low-lying ground covered a substantial area they were looking for something that would not just provide cover but would also be productive.

Establishing a solution

Saltbush was seen as something that could use more water to help control watertables beneath the low-lying ground (and fringing higher productivity ground), while coping with unavoidable increases in salinity during wetter periods.

Old man saltbush was first planted on the low-lying, salt-affected ground in 1994, with 100 seedlings planted just to

"see how they would go." They all established so well that Ted and Martin decided to plant a further 22,000 plants (13 ha) the following year. Early plantings were slow, using a single row broccoli planter, but subsequently things speeded up when they used a contractor with a triple row planter. 27 ha were planted in 1996 and 40 ha per year for the next 4 years, with 200 ha planted all up.

Photo: R Britton

The contractor's triple row planter in action.

Old man saltbush had a reputation for doing well in the Mid North, but since the first planting they chose to plant the variety 'De Kock' which has been selected for improved palatability.

Planting in July/ August fitted in well with the other farm operations and establishment was generally successful except in highly waterlogged areas.

Saltbush plants are typically planted in single rows, 1.5 m apart within rows and 3 m apart between rows. A 4 m row spacing every sixth row is used for vehicle access and mustering, and this results in a planting density of approximately 2100 plants per hectare.

Once established, the inter-row spaces provide good quality feed with medics and volunteer grasses.

The nursery that provided the saltbush plants also provided the planting equipment and labour. The planter creates a weed free corridor but annual grass weeds soon move in. Weed control was achieved by overspraying with 1-1.2 L/ha glyphosate when the saltbushes were well established. Occasional herbicide applications are now used to control inter-row weeds.

The saltbush plants were allowed 2 years to establish before grazing and do not receive fertiliser except at planting.

The system

Cropping occurs on around 2500 ha of the property, rotating wheat and barley followed by a third year of sown medic pasture. Ted and Martin's 2500 head merino ewe flock lamb in the hills, graze the pasture paddocks in spring and go onto the stubble in summer. The 200 ha 'living haystack' (saltbush and understorey pasture) also supports the ewe hoggets and wethers through much of the year and the ewes through autumn up until lambing.

"The saltbush paddocks have become a very valuable part of our farming system," say Ted and Martin. They maintain the condition of stock, providing green feed in autumn when it is most valuable. They take the pressure of bare paddocks and make it much easier to spell the newly seeded pasture paddocks, allowing pastures to get off to a good start. And they help free up land more suited to cropping. Also the ability of saltbush to cope with extended dry periods is one of its great strengths. In dry years the saltbush has proved its worth, effectively drought-proofing the sheep enterprise on the farm.

The saltbush stands have been subdivided into paddocks of 12 to 15 ha, each with its own fresh water supply. Paddocks are rotationally grazed with a mob of about 500 DSE, spending anything from 4-8 weeks in each paddock depending on the amount of feed available. Cattle have also been opportunistically grazed in the saltbush paddocks when there is sufficient feed.

Photo: B Munday

Cattle also opportunistically graze the saltbush.

The sheep generally clean up the understorey pasture before they seriously attack the saltbush. But when they do move onto the saltbush they eventually defoliate it. At this point it is time to move the mob onto the next paddock to allow the plant time to recover. The saltbush paddocks are generally grazed 2 and sometimes 3 times per year.

About every 5 years the saltbush is slashed to a height of about 60 cm to keep the plants at a good grazing height and encourage new growth near the base of the plant. Plants can otherwise reach a height of 2 m or more and shading restricts new growth at grazing height. Using the slasher is time consuming (one row at a time) but it has produced excellent shape and kept foliage within reach of the sheep.

Saltbush should be viewed as a component of a grazing animal's diet, rather than a complete feed. Recent research and producer experience has shown that saltbush can be a good feed source provided its deficiencies are offset by other feed. Saltbush is high in protein but quite low in energy.

Saltbush, and particularly old man saltbush is often not very palatable to sheep (although there can be a fair amount of variability between plants in a stand). Therefore sheep are likely to heavily graze the more palatable plants and inter-row pasture (comprising medics and volunteer species) first. As the inter-row pastures tend to be eaten before the saltbush it becomes necessary to supplement the feed with hay or grain to provide sufficient energy. Ample good quality water is also essential.

High rotational stocking rates are recommended to combat the tendency of sheep to preferentially graze, which is a tactic employed at *Maro Creek*. To further encourage stock to graze the saltbush stand evenly, supplementary feed is put out well away from water troughs.

Mustering in the saltbush can be a challenge and Ted and Martin have found there is no substitute for good working dogs and a motorbike.

Once the inter-row pasture has been eaten, saltbush needs to be supplemented with hay or grain.

Economics

Ted and Martin have realised significant whole-farm benefits from establishing saltland pastures. But looking just at the 200 ha of low-lying ground, they have turned a low to negative profit and high risk cropping area, prone to salinity and waterlogging, into sustainable and profitable grazing land. The jump in productivity following saltbush/ understorey pasture establishment is estimated from 0.2 DSE/ha/year (for failed cereal crops) to 6-10 DSE/ha/year.

For landholders considering similar activities, some example economic figures are provided below. Example costs and benefits expected from pasture establishment (see Table 1) were fed into a profitability calculator (developed by PIRSA economist Graham Trengove).

Greater profits are expected if greater numbers of stock are grazed on the extra feed produced, rather than increasing production from existing animals.

Other areas of the Northern Agricultural Districts have low-lying country impacted by salt, as shown (for example) by these failed crops (left). These types of areas might also be suited to saltbush production. At many sites, watertables are likely to be influenced by both clearing-induced and natural salinity, as indicated by the chenopod shrubland found across the road (right).

Current costs for plants, fertiliser and hire of equipment work out at around 30c/plant or $630/ha (at a planting density of 2100 plants/ha). Supplementary feed requirements are estimated at around 0.75 kg hay per head per week, however these costs are assumed to be accounted for in the sheep gross margin figures.

The life of saltbush stands is not known. The oldest stands on *Maro Creek* are now 12 years old and showing no sign of deterioration. It is expected that stands may remain productive for up to 40 years.

The measures of economic performance shown in Table 2 are:

- 'net present value (10%)' [ie. the total future profit from pasture development in today's dollars assuming a 10% discounting rate], and
- the minimum pasture life to break even.

Table 1. Example costs and benefits for saltbush establishment.

Saltbush establishment		
	Tractor	$20/ha
	Plants, planting equipment & fertliser (2100 plants/ha @ $0.30ea)	$630/ha
Other capital costs		
	Fencing & water	$50/ha
Annual maintenance costs of saltbush stand		
	Includes occasional slashing & herbicide application for inter-row weeds	$10/ha
	*Water (estimate only)	$5/ha
Other factors		
Previous grazing potential of the land		0.2 DSE/ha/yr
Period of grazing foregone during pasture establishment		2 yr
Grazing potential after development		6-10 DSE/ha/yr
Capital invested to purchase additional livestock (once off)		$45/DSE
Estimated life of the saltbush stand		40 yr
Profitability of the livestock (annual gross margin)		$25-35/DSE

*Normal water consumption for sheep grazing grasses is around 400-500L/year. Sheep grazing saltbush can consume 2-3 times this amount, and more during drought. Mixed grazing (saline and non-saline pastures) will be somewhere in between. Water pricing for primary production involves a two-tiered system: 47c/kL up to 125kL/year, and $1.09/kL thereafter (SA Water).

Table 2. Profitability estimates for saltbush pasture establishment based on a 40 year pasture life, under different stocking rates and livestock gross margins.

Values are: *NPV (10%) – the total future profit (per hectare) in today's dollars over the life of the pasture; and **minimum pasture life to break even.

Total stock run following pasture development	Profitability of livestock (annual gross margin)		
(DSE/ha)	$25/DSE	$30/DSE	$35/DSE
6	*$94 / **22 yr	$305 / 13 yr	$516 / 10 yr
8	$395 / 11 yr	$679 / 8 yr	$963 / 7 yr
10	$695 / 8 yr	$1,053 / 6 yr	$1,410 / 5 yr

For example, assuming a gross margin of $25/DSE and a stocking rate of 8 DSE/ha is maintained over the 40 year life of the pasture, the total future profit arising from pasture development in today's dollars (assuming a discounting rate of 10%) would be around $395/ha. To start returning a profit the pasture needs to last at least 11 years.

Further benefits not taken into account in this analysis include:

- Better control of paddock use – eg. on good cropping land, saltland pasture development has freed up requirements for supplementary hay production, hence allowing more crop production.
- Less damage to cropping land (than previously) because the sheep can be taken off stubbles sooner and put onto the valuable summer-autumn feed in the saltland pasture.
- Improving the productivity of areas adjacent to the saltbush stand (through controlling the watertable), and halting the spread of salinity to surrounding areas.
- Drought-proofing the grazing enterprises on the farm.

In situations where salinity levels are lower, saltbush can be planted less densely. This results in greater areas of inter-row pastures while maintaining salinity risk mitigation and out-of-season production benefits from the alleyed saltbush. By matching the density of saltbush plantings to the capability (salinity levels) of the land, production and profitability can be optimised.

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