CASE STUDY

of success with saltland pastures #6

Government of South Australia
Department of Water, Land and Biodiversity Conservation

LandWater & Wool
Shaping the future
Australian Government Land & Water Australia
another innovation
sustainable grazing on saline lands
productive and sustainable ways to use saltland

FITTING SALTLAND INTO THE WHOLE-FARM SYSTEM

Gordon, Neville & Brian Stopp, Mt Charles, Upper South East

The salinity issue

Brothers Gordon, Neville and Brian Stopp run a mixed enterprise (cropping, lucerne seed, wool and prime lamb) farm near Keith in the Upper South East (USE). In this region, sandy rises, dunes and inter-dunal flats sit on top of a highly transmissive regional-scale limestone aquifer. This means that once this groundwater system fills up, it can become a problem for large areas of low-lying ground. Salinity and waterlogging issues were naturally present in low-lying parts of the landscape, but they intensified following clearing and became particularly obvious problems following wet years.

The Stopps run two properties: the home farm (1500 ha) about 10 km north-west of Keith where salinity is only a minor problem; and the 'McNamara' block (2200 ha) about 15 km west of the home farm where salt is a major issue. 'McNamara' retains about 480 ha of heritage scrub and about 310 ha of swamp, shelter and wasteland, while 400 ha of the 1400 ha grazing country is highly salt-affected.

They first noticed salinity in 1981, which was a very wet year, not long after the aphids had knocked out most of the region's lucerne. "The flats at 'McNamara', until then the best grazing land, were reduced to bare scald and were practically useless," the brothers recall. "This was followed in 1982 by the most serious drought for 40 years, which put great pressure on the sandy rises that were carrying the breeding flock we wanted to retain."

Photo: B Munday

Gordon and Neville Stopp with some of their merinos.

Fast facts

Farmer name	Gordon, Neville and Brian Stopp
Farm location	Mt Charles (near Keith), Upper South East
Enterprise mix	Cereal cropping, lucerne seed, wool, prime lambs, cattle (with seasonal feedlotting)
Saltland pastures	Puccinellia, lucerne
Rainfall pattern	500 mm, winter dominant
Catchment clearing date(s)	Up until the early 1980s
Salinity appearance	Natural salinity and waterlogging on inter-dunal flats has been made worse following clearing. Wet years exacerbate the problem.
Original vegetation	Melaleucas, Mallees, chenopod shrubland
Saltland soils	250 ha of heavy, hard setting clays on coastal creek flats. High sodicity and high boron.
pH range (water)*	8.4 – 9.1
EC(1:5) range*	0.99 – 5.62 dS/m
[*From testing of SGSL trial site Nov 2003]	
Depth to watertable*	0.95 m
Motivations for taking action	Reclaim production from a large area of grazing land that had been lost to salinity

Pioneers with puccinellia

Back in the 1980s it was very difficult to manage this saltland as little was known about appropriate management practices. They tried many different and supposedly salt-tolerant pastures and establishment techniques with very

little success. “From all the trials, only puccinellia showed any real promise.”

Over the years the brothers have been pioneers in the emerging field of saltland pastures, generating a great deal of knowledge about the value of weed control, fertiliser requirements and grazing management. Their own trial and error has been a large source of this new knowledge, however they have also benefited from links with a network of like-minded graziers in the USE and with agronomists from Primary Industries and Resources SA.

The Stopps now find that establishing puccinellia is straightforward provided the sea barley grass is controlled by spray-topping for at least one year before seeding and provided also that the seedlings are well up before the winter flooding. “We scratch up the ground, spread the seed from a snail bait spreader and follow with a roller. The puccinellia also responds well to fertiliser which we apply at 50 kg/ha of 19:10:0:13 (NPKS), doubling the rate if we intend harvesting the seed. We don’t graze in the first year and of course we shut up areas that are to be reaped for seed.”

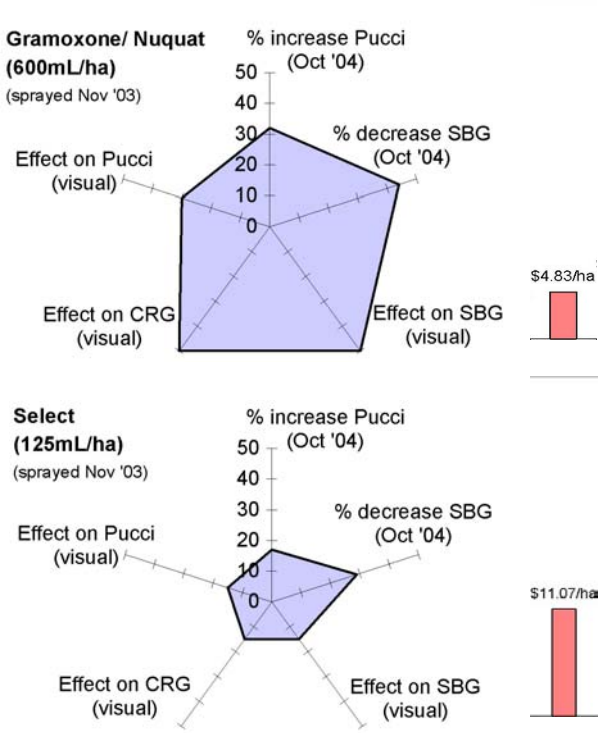
With 99% of their saltland country (areas that would have been bare ground) now productive under puccinellia, the Stopp brothers could have rested on their laurels. Instead they continue to build on their understanding and generously give up their time to raise awareness of saltland pastures within the farming community.

In recent years, they have been undertaking more advanced trials into weed control in established puccinellia pastures. In pastures up to 20 years old, weeds such as sea barley grass and curly ryegrass can increase over time and reduce grazing production. Sea barley grass is particularly invasive and can take over a puccinellia pasture during significant dry periods. The trials were undertaken through Land Water & Wool’s ‘Sustainable Grazing on Saline Lands’ (SGSL) sub-program with the aim of identifying herbicides that could control these weeds while minimising damage to the established puccinellia.

The ‘Dosatron’ mounted spray rig used in the SGSL trials.

SGSL project officers inspect the spray trial plots.

“In the past, if we had an ailing puccinellia pasture, the only way to establish a better pasture was to remove the existing pasture, tidy up the weeds and resow it,” says Gordon. “Instead of going to the expense of renovation, with this trial we have established the level of spray-top chemical needed to minimise weed pressure to allow the existing puccinellia to grow to its potential.”



When comparing herbicides, radar plots showed both quantitative (pasture composition counts) and qualitative data. The bigger the plot, the better the performance.

For controlling both sea barley grass and curly rye grass, Paraquat (250 g/L) herbicide at 600 mL/ha or 400 mL/ha (with a trade off between quantity/ cost and duration of impact) was found to be one of the most cost effective

options. However curly ryegrass, the less productive of the two weeds, can often establish in the gaps left behind once the initial weed plants are taken out. This reinforces the need to maintain a competitive puccinellia pasture through adequate phosphorus levels (at least 12 mg/kg, Colwell P) and periodic nitrogen applications. Of course good weed control in the establishment phase is considered essential.

The system

Despite the real management challenges, the 400 ha of saltland on 'McNamara' now fits very nicely into the Stopps' whole farm system. They have completed a property management plan with the aims of reducing groundwater recharge, managing different land classes sustainably and achieving productive grazing to complement their other farming enterprises.

'McNamara' is chiefly a grazing block, where for much of the year the Stopps run their 3200 merino ewes with lambs and 1200 hoggets. 'McNamara' is relatively cheap land, but managed carefully it provides very good sheep breeding country. With a combination of flats and hills, abundant shelter and perennial pastures the Stopps achieve 120% lambing with cross-breds and 100% with merinos.

Much of the higher country has been sown to lucerne, with primrose and veldt grass also used on the higher sand dunes. The Stopps are increasing the area under lucerne each year, as the plant is seen as invaluable in stabilising sandy rises, reducing recharge and increasing productivity. "Establishing lucerne has been a challenge since the Hunter River variety was wiped out in 1978 by the aphids and with increasing incidence of non-wetting sands," says Gordon. "We have had considerable success with the variety Trifecta and we are now trialling Hallmark." The Stopps' winning formula for lucerne establishment involves firstly spray-topping in spring, particularly to remove silvergrass. After a knockdown herbicide they sow late winter into furrows 25 cm apart, applying a wetter behind the press wheels and lime at 80 kg/ha through the fertiliser box. Clay spreading has been used with great success on non-wetting sands in the Upper South East, and they are keen to try this if suitable clay can be located nearby.

The salty flats have been sown to puccinellia and the larger areas fenced off so that they can be managed separately. "Puccinellia has proved to be an excellent pasture for our sheep," they are keen to point out. It provides a nutritious seed-free environment for weaners before shearing in November and quality dry feed in autumn to extend the paddock rotation rest period when the lucerne is becoming less active. "With the right management and the extra moisture available, our saltland can be highly productive ground," says Gordon.

The home farm is largely involved with cropping and lucerne seed production. Of the 1500 ha on the home farm, 1100 ha is continuously cropped and most of the remainder is sown down to dryland lucerne for seed production. Cross-bred weaners are often brought from 'McNamara' to the more productive home property and finished on grain and lucerne stubbles. In this way the grazing of saltland pastures nicely complements the Stopps' cropping and seed production enterprises.

More work to do

Break of slope situations, between the sandy rises and the flats, are a frustrating part of the landscape for the brothers. This potentially productive land is too high above the watertable to support puccinellia but too low for lucerne once its roots reach the saline groundwater. They are currently trialling Salado lucerne in this area because of its relative salt tolerance. Another thing they would like to see in their saltland pastures is a truly salt-tolerant legume.

Economics

While quantifying whole-farm benefits from establishing saltland pastures such as puccinellia is somewhat difficult, economic analysis can demonstrate the profitability of establishing saltland pastures in their own right.

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).

The jump in productivity from scalded saline flats to productive puccinellia pasture following development is assumed to correspond to a rise in potential stocking rates from 0.2-0.5 DSE/ha to 5-8 DSE/ha.

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

The estimated pasture life (12 years) in Table 1 is conservative. Some of the Stopps' puccinellia pastures are over 20 years old.

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 puccinellia establishment.

Pasture establishment		
Cultivation		$20/ha
Seed	Pucci (10kg/ha x $5/kg)	$50/ha
Fertiliser	50kg/ha 19:10:0:13 (NPKS) x $500/t	$25/ha
Weed & pest control	Spray-top in spring prior to sowing plus knockdown at break of season; & RLEM control	$10/ha
Infrastructure	Fencing & water (estimate only)	$100/ha
Pasture maintenance		
Fertiliser	50kg/ha 19:10:0:13 (NPKS) x $500/t	$25/ha
*Water costs	Estimate only	$5/ha
Other factors		
Previous grazing potential of the land		0.5 DSE/ha
Grazing potential after development		5-8 DSE/ha
Capital invested to purchase additional livestock (once off)		$45/DSE
Estimated life of the pasture		12 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 of puccinellia establishment based on a 12 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
5	*$137 / **6 yr	$262 / 4 yr	$386 / 3 yr
6	$252 / 4 yr	$405 / 3 yr	$558 / 3 yr
7	$368 / 3 yr	$549 / 3 yr	$730 / 2 yr

For example, assuming a gross margin of $25/DSE and a stocking rate of 6 DSE/ha is maintained over the 12 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 $252/ha. To start returning a profit the pasture needs to last at least 4 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 before they do damage and put onto the valuable summer-autumn feed in the saltland pasture.
- Greater numbers of sheep run across the property to help keep down weeds and break down stubbles.

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