REVEGETATING A SALT SCALD IN THE NARANGARIE VALLEY – DUNEDOO 1

Case study — Dunedoo 1

FARMER: NEVILLE STANFORD, LEADVILLE, NEAR DUNEDOO, NSW

QUICK FACTS

Area of site: 5 ha

Soil type: mostly a light clay with some sandy loam

Watertable: only at surface in wet seasons

Soil salinity (EC_e): 0.5–20.5 dS/m (0–10 cm). See 'Salt profile' below for more information.

Soil pH (water): 5.4–6.6

Pastures sown: a lucerne mix and a fescue mix

The problem

Narangarie Valley is a very salty sub-catchment. The salinity issue dates back to the 1930s and has periodically been a problem. During the early 1990s salinity seemed to increase and spread. In 1994 a number of landholders met because big, bare salt-scalded areas were starting to spread and threaten production. The Narangarie Valley Salinity Group was officially formed in 1997.

In 2003 the site had patches of extremely saline soil. The best efforts to revegetate these areas had met with only very limited success, and the areas had remained bare. Lucerne had died out in the wet areas, even though they are waterlogged only for a short while. After flooding in 2000, a light to medium infestation of weeds had appeared (Paterson's curse, couch, wiregrass, paddymelon, khaki weed, caltrop and Bathurst burr).

Before: *This photo was taken in November 2004. Before sowing, the paddock was scalded and extremely saline in parts. It had a major infestation of wireweed, which is quite tolerant of saline conditions.*

The plan

Neville's priority was to find what would grow on these sites. He wanted to test salt-tolerant pasture species and their ability to grow in Narangarie's salty conditions. He decided to have a lucerne mix and a fescue mix – two treatments. He decided not to plant tall wheatgrass, because he feels it grows too big for sheep feed, and he does not have cattle.

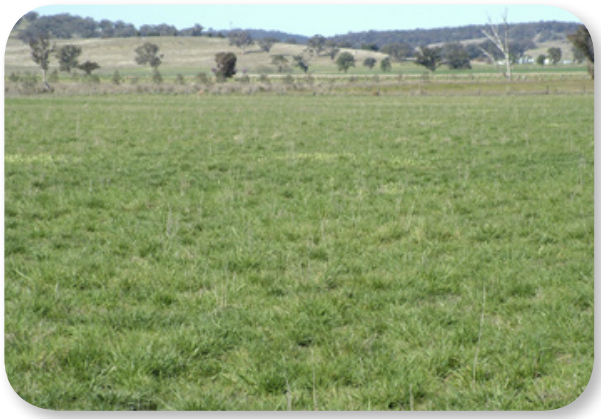
Salt profile

At the salty end of the paddock there were two saline outbreaks, separated by 200 metres of non-saline land.

Deep soil sampling in this area (six holes), showed that:

- areas saline at the surface remained quite saline (EC_e around 5 dS/m) down to 1 m depth
- areas fresh at the surface remained fresh down to 1 m depth.

The site was also sodic in the worst areas.



Jenene Kidston

Jenene Kidston

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After: *(Top) The fescue pasture 1 year after sowing. (Bottom) The lucerne pasture 1 year after sowing.*

Actions taken at the site

In January 2005 the paddock was scarified for couch-grass control. In February, the weeds were sprayed with a knockdown herbicide. In late May, it was grazed for weed control. In late July weeds were again sprayed with a knockdown herbicide.

From mid-March to mid-June no rainfall was recorded. The top 5 cm became very dry.

Gypsum was applied at 1 t/ha to half of each area as a trial: that is, half the intended lucerne area and half the intended fescue area were treated.

On 29 August, the following pasture mix was sown in the intended 'lucerne' area:

- 6 kg/ha Salado lucerne
- 1 kg/ha Puna chicory
- 1 kg/ha Tonic plantain
- 0.5 kg/ha strawberry clover
- 0.5 kg/ha balansa clover

The next day the following grass mix was sown in the adjacent 'fescue' area (which was at the saltier end of the paddock):

- 5 kg/ha Quantum fescue
- 0.5 kg/ha Currie cocksfoot
- 0.5 kg/ha Holdfast phalaris
- 0.5 kg/ha Vic rye
- 0.2 kg/ha Dallas paspalum

The row spacing was 15 cm. Seeds were sown with a band seeder with rubber-tyned rollers. A Gyral 21-run, direct-drill combine was used to apply fertiliser. In the lucerne area 80 kg/ha single superphosphate was applied, and in the fescue area 80 kg/ha Starter Fos was used.

There was very good germination. The soil was dry on top, but there was reasonable subsoil moisture. This paddock is subject to heavy frosts during July to early August.

In October the whole area was sprayed to kill wireweed. This was not successful. A few weeks later the fescue area was sprayed again to kill wireweed; this action was successful.

In November the paddock had started to dry off. It was grazed with 200 ewes and 300 lambs for 8 to 10 days.

In January 2006 the paddock had started to hay off under hot conditions. Neville decided to graze it with sheep to reduce the excess growth, so in February 100 ewes and 150 lambs were put in. Neville also cut 21 round bales of 400 kg each. In April 100 ewes and 150 lambs were put in for 7 days to clean up after the hay cutting. Grazing was even across the pasture species.

The paddock had therefore been nursed along to ensure it was looked after.

Results

(pasture readings taken by Jenene Kidston, Agronomist, Industry & Investment NSW, Mudgee)

Fescue area

Pasture composition (%)

Species	November 2005	September 2006
Ryegrass	6	46
Phalaris	2	2
Tall fescue	31	32
Couch	1	4
Cocksfoot	2	2
Annual weeds	58	14

Ground cover (%)

Type	November 2005	September 2006
Living plants	89	61
Litter	–	20
Bare ground	11	19

Lucerne area

Pasture composition (%)

Species	November 2005	September 2006
Wireweed	38	16
Lucerne	41	41
Chicory	3	0
Plantain	1	0
Windmill grass	1	0
Clover	16	17
Annual weeds	0	15
Ryegrass	0	11

Ground cover (%)

Type	November 2005	September 2006
Living plants	77	58
Litter	–	23
Bare ground	23	19

Conclusions from Industry & Investment NSW

By Jenene Kidston, Agronomist, Industry & Investment NSW, Mudgee

This site has a history of attempts at crop, pasture and lucerne establishment in an effort to achieve ground cover. The north-eastern part of the paddock, sown to tall fescue, ryegrass, phalaris, paspalum and cocksfoot, was more saline than the south-eastern end of the paddock, sown to lucerne, chicory, plantain and clovers.

Survey of the pasture on the north-eastern side of the paddock indicated that there was good survival of the

tall fescue and ryegrass. However, there was very little phalaris or cocksfoot and no paspalum surviving after the first year. In the areas of the paddock where salinity was highest there was little fescue; those areas had been invaded by annual ryegrass, couch and wireweed, which are more salt tolerant than tall fescue.

It is likely that the annual weed burden was generally constant in both pastures, although it was difficult to differentiate between the perennial ryegrass that was sown in the grass mix and annual ryegrass. Both pasture mixes were only moderately salt tolerant, and it appeared that in most of the saline parts of the site desirable plants were being lost in favour of more salt-tolerant weeds, particularly wireweed, couch and annual ryegrass. These pastures will require judicious grazing management to maintain the pasture for the long term over the entire site. In the future it may be necessary to sow more tolerant species in the most saline parts of the site.

Final comments from the landholder

The grass area (at the saltier end of the paddock) has had a pretty good result – it looked good in spring. Some perennial rye was present.

This project has proven pasture will grow and is palatable. It has given us confidence we can handle salinity, where before we had no hope. It looks like we can get production where we thought it would just stay a sheep camp scald. Also it is perennial, so we can get continual production. We want to allow it to set seed. Without set stocking the pasture should persist. But the test will be the next dry spell and how it persists then. Even 5 years would be a success in our eyes; ideally it will go longer.

The stand is good enough to compete with weeds. I am very happy with the result. I want a grass-based pasture so we can control broadleaf weeds. Gypsum has been applied to half of both areas. It seemed to have an effect: there was a noticeable colour difference.

The chicory and plantain were killed by the herbicides. There was a good strike of lucerne but it appeared to be lacking something.

Note that the locusts were very bad during the plague a couple of years ago.

Neville Stanford, 2006

Prepared by Luke Beange, Advisory Officer, Industry & Investment NSW, Dubbo

Acknowledgments

Jenene Kidston, Agronomist, Industry & Investment NSW, Mudgee.

NSW Salt Teams.

APPENDIX

Surface soil data (0–10 cm, late summer 2004)

Good patch[B]	Bad patch[B]	Bulk[A]
pH at surface ($CaCl_2$)		
5.2	5.4	7.9
Salinity, late summer (est. EC_e, dS/m)		
0.6	10.6	1.4
Organic carbon %		
1.6	1.2	1.4
Sulfate sulfur (KCl) mg/kg		
4.2	30	4.5
Phosphorus (Colwell) mg/kg		
41	33	110
CEC meq/100 g		
7.5	14	22.7
Ca/Mg ratio		
1.1	0.77	1.3
Sodicity, ESP %		
3.9	24	3.8

[A] *Samples used for measurements were taken from at least six holes (0–10 cm deep) made in locations with a range of salinity symptoms (visually assessed).*

[B] *Samples used for measurements were taken from one hole (0–10 cm deep) made in a location with no salinity symptoms and one in a location with extreme salinity symptoms (visually assessed).*

Notes:

CEC, cation exchange capacity

ESP, exchangeable sodium percentage

Non-saline < 1.5 dS/m; saline > 1.5 dS/m.

Non-sodic, ESP > 6%; sodic 6%–14%; strongly sodic > 14%.

For further information, see the *Glove Box Guide to Salinity* (NSW DPI) for your part of NSW, on the page headed 'Soil testing for salinity and sodicity'.

Rainfall during trial (mm) (average annual rainfall = 633 mm at Mudgee)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
2004	24	91	26	14	51	34	42	39	36	49	50	127	**582**
2005	37	55	51	0	0	112	38	18	98	69	96	39	**604**
2006	86	61	10	36	1	30	70	11	17	0	51	51	**423**

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