PRODUCTIVE LUCERNE FROM A WET, SALTY PADDOCK NEAR WAGGA WAGGA

Case study — Wagga Wagga

LANDHOLDERS: DAVID AND BELINDA MACLURE, KEAJURA PARK, NEAR WAGGA WAGGA

QUICK FACTS

Area of site: 20 ha

Soil salinity (EC_e) near surface: 1–15 dS/m

Soil salinity (EC_e) around 50 cm: 0.2–7 dS/m

Soil salinity (EC_e) around 100 cm: 0.3–4 dS/m

Sodicity (ESP) (0-10 cm): 10–60 (very high)

Soil pH (water): 4.9–6.1

The problem

In 2003, in the middle of a drought, an existing 20 ha saline site on the Maclures' property began to discharge saline water and 'bare off'. This area had been getting barer and wetter each year. In supposedly the driest year on record, the Maclures bogged the spreader in the paddock. As a result, the area was effectively out of production. The saline, waterlogged soil was prone to erosion, threatened farm water quality, and made traffic movement difficult. The Maclures wondered how much worse it was going to get, and how much ground they were going to lose.

The Maclures thought they should do something about it, so in 2003 they began a trial to investigate how best to manage the increasingly saline discharge site.

Another reason for developing the project was to trial varieties of lucerne for waterlogging and salinity tolerance. There was very little information on this relevant to the southern part of NSW, and very few landholders were using lucerne on saline or waterlogged sites. Some varieties had shown potential on slightly waterlogged sites.

Deb Slinger

Before: *This picture shows the site in June 2003 just before the first rain events in the area. In January 2003 the site was completely waterlogged, even though we had just been through the driest period in 100 years. The site had been evident over the previous two drought years, with the waterlogged area growing in size during this time.*

Deb Slinger

Before: *In June 2003 the site was badly waterlogged.*

Deb Slinger

After: *Part of the site in December 2004. Note the successful establishment of lucerne.*

Actions taken at the site

The project aimed to provide the following pasture information:

- species emergence
- survival through summer months
- survival through the inundation caused by winter high watertables and runoff.

In January 2004 weeds present (in order of abundance) were sea barley grass, annual beard grass, wireweed and loose strife. In preparation for sowing, two passes were made with the scarifier.

The pasture was sown with the small-seeds belt in one pass with the combine in late June 2004. Soil moisture was good, and there were some wet areas in the drainage lines. Wet areas were hand sown. Weeds present at sowing time were sea barley grass, Paterson's curse, ryegrass, barley grass, and annual beard grass. The paddock was sprayed with knockdown and pre-emergent herbicides and an insecticide for mites. Lime (2.5 t/ha) and DAP (125 kg/ha) were applied at sowing. The soil pH varied from 4.9 through to 6.1 across the site.

Species sown (per hectare) were as follows:

Test area 1:

- 50 kg highly winter active lucerne (in wet areas)
- 50 kg semi winter dormant lucerne
- 7 kg tall wheatgrass
- 3 kg puccinellia
- 3 kg strawberry clover

Test area 2:

- 4 kg fescue
- 3 kg strawberry clover
- 3.5 kg Australian phalaris
- 3.5 kg Landmaster phalaris
- 1.5 kg balansa clover.

Results

Pasture emerged 3 weeks after sowing. There was an excellent strike of lucerne, strawberry clover and phalaris. Puccinellia and tall wheatgrass were not noticed at this stage, but there was plenty of ryegrass, annual beard grass, and sea barley grass. Red-legged earth mite was present and was sprayed 4 weeks after sowing.

Single super (250 kg/ha) was applied in February 2006, and subsequently 200 kg/ha was applied every year thereafter.

Grasses had been slow to emerge, but with the June 2005 break the site regenerated successfully.

Owing to the success of the lucerne establishment, by December 2005 the waterlogging had been reduced substantially, and this had helped the persistence of the highly winter active lucerne. The whole site had dried out and was accessible, unlike in spring 2004, when the paddock was badly waterlogged.

In December 2004 (within 6 months of sowing of the lucerne) the landholder cut 190 silage bales, and in December 2005 two hundred and fifty silage bales were cut from the lucerne area; they had an approximate value of $82 per silage roll.

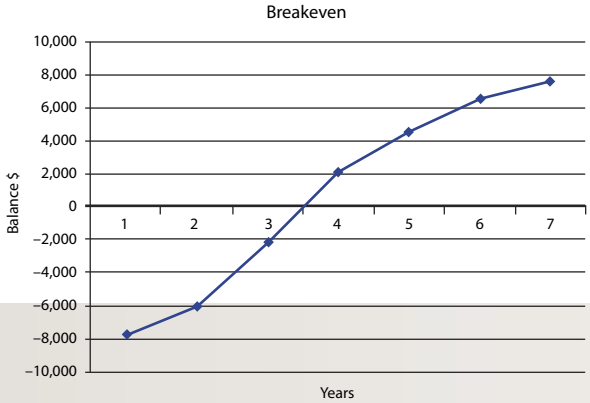
The site over the previous 10 years had had limited grazing because of access problems resulting from the waterlogging. Grazing was therefore generally fairly light to make sure that the pastures established well and were not overgrazed. In the 8 weeks of the period May to July 2006, 360 wethers grazed the site. (On another 9.7 ha there was no grazing for 2 years, after which time 36 heifers and calves were let in from July 2006 to the end of October 2006.)

Economics of the site (calculated in 2005)

The landholders produced 190 silage rolls from 20 ha in year 1 and 250 silage rolls in year 2. The assumption is that similar yields would be experienced in year 3 and that yields would slowly decline from years 4 to 6.

The bales weighed an average of 0.5 t and yielded 50% dry matter.

The price was set at $180 per tonne for dry matter and the cost of production was set at a flat rate of $250/ha.



The payback period on the investment is 3.5 years. All $ returns after this time are profit.

Maintenance costs included topdressing of single super at 125 kg/ha and a yearly spray for pests and weeds.

The pasture establishment cost ($354/ha) was recouped in year 1 (assuming that the capital was borrowed at 9% interest).

Final comments from landholders

David and Belinda commented that:

The only thing holding farmers back from doing this is the money. This exercise cost $17,000 for 125 acres. It is especially important to get started in the worst parts – to be able to get onto the ground to be able to sow. And once established, you can gradually increase stocking rates.

The key is to lock up the pastures to let them seed down.

Now we think our salt areas could be more productive ground. By getting the right pastures and looking after it, production increased by double at least.

It is hard to assess whether [the ground] is drying up, but it must be, because there is heaps more grass here now. We heard mixed reports about [a variety of] lucerne, but it is performing well [in winter 2006] and is winter active and so far is persisting. Keeping stock in one fenced paddock at a time has worked well, because we can control grazing, resting and recovering.

We had new seed germinating in 2006 from the previous year, and were planning to cut lucerne for silage again.

Note: A video about this project can be viewed on the *Saltland Genie* website www.saltlandgenie.org.au/my-region/nsw.htm

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Acknowledgments

Most of the work at this site was organised by Deb Slinger, formerly Salt Team Leader with I&I NSW, who also provided most of the text. Michael Reynolds, formerly salinity economist with I&I NSW, provided the economics.

NSW Salt Teams.

APPENDIX

Surface (0–10 cm) soil data

Good patch[B]	Bad patch[B]	Bulk[A]
pH at surface ($CaCl_2$)		
5.8	6.0	6.0
Salinity, late summer (est. EC_e dS/m)		
1.4	15.4	6.8
Organic carbon %		
2.0	2.0	1.6
Sulfate sulfur (KCl) mg/kg		
16	280	120
Phosphorus (Colwell) mg/kg		
13	21	23
CEC meq/100 g		
3.7	23	10.7
Ca/Mg ratio		
2.8	0.32	1.1
Sodicity ESP %		
10	60	40

[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

Salinity: Non-saline 0 to < 1.5 dS/m; saline > 1.5 dS/m.

Sodicity: 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 = 525 mm at Wagga Wagga)

	Jan	Feb	Mar	Apr	May	Jun
2004	29	8	8	11	60	90
2005	12	79	15	7	4	89
2006	42	0	19	24	3	42

	Jul	Aug	Sep	Oct	Nov	Dec	Total
2004	52	67	64	33	112	59	**593**
2005	78	79	118	94	36	39	**650**
2006	45	10	15	5	25	5	**208**

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