Insights

Case studies on how farmers are successfully managing saltland for profit and sustainability

A supplement to **Saltland Pastures in Australia**
– a practical guide

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

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Introduction and Acknowledgements

About 2.6 million hectares in the high rainfall and mixed farming zones of Australia are already affected by dryland salinity, and this is projected to at least double over the next 20 years. Nationally, 41 per cent of woolgrowers have reported dryland salinity on their properties – 78 per cent in Western Australia, the State most affected at this stage.

Land, Water & Wool is a joint investment between the wool industry's peak research and development body, Australian Wool Innovation Limited, and the nation's premier investor in natural resource management research, Land & Water Australia. It is the only national initiative that addresses the productive management of land and water resources specifically for woolgrowers.

Sustainable Grazing on Saline Land (SGSL) is the largest of the seven Land, Water & Wool sub-programs and aims to support woolgrowers who have land already affected by dryland salinity.

SGSL was established to achieve:

- improved production and profit from grazing saline land;
- better environmental outcomes from saline land; and
- more pride for producers who have saline land on their properties and are being proactive about applying new management systems.

SGSL is achieving this through a combination of activities that will help livestock producers better understand and manage their saline land.

SGSL is proudly supported by the following partners: Western Australian Department of Agriculture, the CRC for Plant-based Management of Dryland Salinity, Meat and Livestock Australia, Australia's National Dryland Salinity Program, Rural Solutions South Australia, CSIRO, the Victorian Department of Sustainability and Environment and Department of Primary Industries, NSW Agriculture and the NSW Department of Infrastructure, Planning and Natural Resources.

Saltland Pastures in Australia: A Practical Guide is one of the country's most successful salinity management publications, providing invaluable knowledge and experience in regard to this major environmental issue.

That is why we are developing a range of supporting publications, such as *Insights*, to ensure this vital information about understanding and managing dryland salinity is shared with the widest possible audience. *Insights* expands upon the grower case studies contained in the *Saltland Pastures* book, profiling how 10 growers are managing their salt-affected land for productivity, amenity and profit.

While profitability is a consideration in the way the case study producers run their farm businesses, it is not the only or in some cases even the most important consideration leading to an investment of time and resources into improving salt-affected land. As a group, the case study growers derive a high level of satisfaction and personal pride from improving the productivity and visual appeal of their properties – often that pride had been visibly dented by the advance of dryland salinity.

It is a tribute to the enthusiasm and commitment of the case study growers that in the face of this uncertainty they have persisted with their collective vision of developing productive saltland systems.

Sincere thanks to all the growers who helped us in this project, especially those who gave up their time and their stories to assist the Land, Water & Wool SGSL sub-program. Many of them already give several days a year voluntarily to field days, meetings and conferences about saltland management, and they are an inspiration to us all.

It is amazing what these 10 growers have done to turn adversity into advantage, and to provide such practical leadership in the fight against dryland salinity. If you have salt-affected land, this is a 'must read' - I was truly inspired by their stories, and I think you will be too!

I would also like to thank the project team who collected, synthesised and reported the 10 individual stories during 2002, and who worked to draw out the common lessons as a basis on which SGSL could build. The team was led by John Powell, who prepared the template/process and completed the NSW case studies. John was ably supported by Darrel Brewin (Victoria), Bruce Munday (South Australia) and Michael Lloyd (Western Australia).

Jane Thomas and Kim Mitchell from Currie Communications, together with Fleur Flanery from Land & Water Australia, assisted with the editing and presentation of this publication.

Special thanks also go to artist Allyson Parsons who painted the wonderful saltland scene for the cover of *Saltland Pastures in Australia*, a painting that we have used again on the cover of *Insights*.

Dr Warren Mason
SGSL National Coordinator

February 2004

Disclaimer
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Andrew Southwell, 'Glenflesk' – The saline water table is still at the surface, but rotational grazing maintains groundcover and prevents erosion (Photo: John Powell)

Case 1

Saltland generates higher returns than improved pastures

Andrew and Michelle Southwell
'Glenflesk'
Rye Park NSW

Business Profile

Location: Southern Tablelands, NSW

Area: 1189 ha

Mean annual rainfall: 740 mm

Enterprises: Fine wool Merino breeding

Landform and soil types: Loamy clays in valley floors; sedimentary hills

Key Points

- **Stocking on saltland is higher than on improved pastures**
- **Inexpensive electric fencing suits small discharge areas**
- **Visual amenity is dramatically improved**

Our farm

'Glenflesk' and 'Edenbrae' comprise a total of 1189 hectares near Rye Park in the upper Lachlan catchment in New South Wales. 'Edenbrae' has been in the family since 1950, and 'Glenflesk' was bought when I came home from agricultural college in 1982.

When we bought 'Glenflesk' we knew that it had had a hard time for many years. In addition to being overgrazed, it had some serious salt scalds, one of which was still actively eroding. Eroded yellow subsoil from this site was moving several kilometres down a creek that became known to the locals as 'yellow gutter'. And of course the locals all knew where that yellow mud came from!

Like most other producers, we had a difficult time during the 1982-83 drought. Then 1984 was very wet and the area of salinised land, especially on the better soils of 'Edenbrae', expanded dramatically.

By the mid to late 1980s we had lost about 120 ha across both properties to salinity. This meant that we were carrying about 420 dry sheep equivalents (DSE) less than we used to, and our carrying capacity was getting less and less all the time. Dad and I had always prided ourselves on being good land managers, but our place was getting worse, not better. We knew we had to do something.

Learning to manage the saltland

In the mid-1980s there was virtually no information available to us on managing saltland. I did have some contact with the local agronomist, but we generally did it by trial and error, starting with a small area and going on from there.

Like many other areas of the Southern Tablelands, the salted areas on 'Glenflesk' and 'Edenbrae' were patchy – mostly only a few hectares here and there. Although the saltland was causing big production losses, it was going to be difficult to manage.

I'm still not sure whether it was the right thing to do, but in 1984 we started with the discharge site that was sending eroded subsoil down the 'yellow gutter'. The sheep were camping on this site, dust was getting into the wool, it was an eyesore, and of course everyone knew that the yellow mud was coming from our place.

In the end, it cost us almost $5000 to fix just 9 ha, mainly because of the amount of earthworks and the difficult fencing we had to do. But the things we tried generally worked, and gave us the confidence to go on with the other saline areas.

We had also saved our reputation as good land managers!

Going from strength to strength

In the early 1990s I did *Grazing for Profit* and *Prograze* courses and read everything I could about grazing systems, including Allan Savory's book *Holistic Resource Management*.

Information about how to manage saltland was becoming more readily available, and I developed a much better understanding of the merits of rotational grazing with bigger mobs of sheep on smaller paddocks. At about this time the wool market crashed, giving us even more incentive to increase our production.

Over the 1990s we progressively subdivided paddocks and improved the pastures on our good land. We also fenced off and sowed our saltland with a 'shotgun' mix of tall wheat grass, puccinnellia, fescue, phalaris, ryegrass, cocksfoot, strawberry clover and white clover. We now have about 120 ha across both properties under our saltland system. We have recorded what all our paddocks carry over a 12-month period, and surprisingly the saltland carries 11 DSE/ha/year on average, while the improved pastures carry only 8 DSE/ha/year!

We have learned that it is essential to get onto the saltland before you lose too much topsoil from erosion. Salt-tolerant pastures actually generate more profit on our properties than improved pastures on the good land, because the sowing costs per hectare are about the same, but the carrying capacity of saltland is higher.

The saltland is essentially an underground irrigation system during dry summers and autumns, and this really makes a difference to weaner growth rates and ewe joining weights. The salinity of our water table, which is still at or near ground level, ranges from about 0.7 deciSiemens per metre to about 6.5 dS/m, depending on which piezometer is being measured. We realise of course that some of our saltland pasture mix might struggle in saltier environments than this.

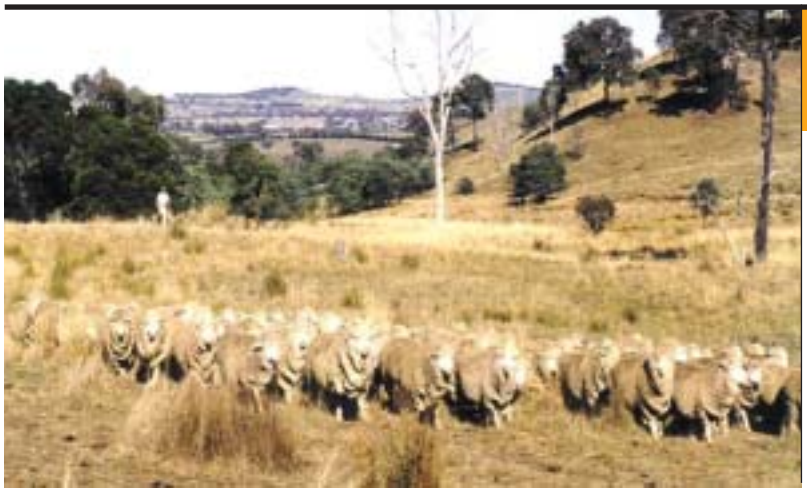
The future

The saltland is now an integral part of our rotational grazing system. The latest thing we have discovered is that four-wire electric fencing is a much more flexible and economical way to fence off saltland. We will be doing more of this in the future.

Overall, from the mid-1980s until now in 2002 we have increased our carrying capacity from about 7000 DSE to 8800 DSE. Most of this is due to the improved pastures, but the saltland is also an important contributor and provides valuable green feed in dry spells.

We are also very satisfied that we have been able to overcome a challenging problem and happy that the two properties look a lot better for it.

Andrew Southwell



'Glenflesk' - The 'yellow gutter' site 15 years after rehabilitation (Photo: John Powell)

Lachlan Campbell at 'Easterfield'
(Photo: courtesy The Land Newspaper)

Case 2

Merino weaners thrive on saltland

Lachlan Campbell
'Easterfield'
Mumbil, NSW

Business Profile

Location: Central West NSW

Area: 870 ha

Mean annual rainfall: 650 mm

Enterprises: Fine wool Merino breeding

Landforms and soil types: Clays in valleys; shale sediments on hills

Key Points

- **Palatable green feed from saltland improves weaner growth**
- **Saltland is a key part of a whole farm grazing rotation**
- **Long rest periods heal scalded land and restore biodiversity**

Our farm

'Easterfield' is on the Wellington road just out of the village of Mumbil in central New South Wales. Wellington is a mixed farming and grazing area in the middle of the wheat/sheep belt.

'Easterfield' is a 208-hectare block adjoining our 662 ha family property 'Bonada'. The properties are managed as a rotationally-grazed fine wool Merino breeding operation comprising about 8000 DSE.

Learning to live with the saltland

During the downturn in the wool industry in the mid-1990s we seriously questioned why we should continue wool growing. I had been involved in futures trading in Sydney for a while and knew that there were easier ways to make a living. But wool was what our family knew, and we had invested a lot of money and social capital in the industry over the years.

After much soul searching we decided that fine wool did have a future, and that we wanted to remain in the wool growing business. But to survive and prosper, we knew we had to scale up the size of our operation by increasing property size and by increasing our stocking rate. 'Easterfield' adjoined our existing property and had a good home on it, so when it came up for sale in 1998 we decided to buy it.

We bought 'Easterfield' knowing that it had a salinity problem. A 14 ha saline paddock next to the house had a CSIRO saline agroforestry trial on it, and the rest of the paddock had been sown to tall wheat grass and puccinnellia. But like most of the property, it had been set stocked and the salty area was bare and eroding.

An additional 40 ha paddock across the Wellington road was also partly scalded, and what wasn't saline became waterlogged after the 1997-98 drought broke.

These 14 ha and 40 ha paddocks are the largest discrete areas of saline and waterlogged land on 'Easterfield'. They make up an almost flat valley floor that the Wellington road passes through.

Years ago this 54 ha area would have been the most productive land on the place, having the deepest and best soils. However, it is on a local groundwater system that is recharged from the hills and slopes that were almost completely cleared of trees. The high volumes of water that now leak past the root zone of the pastures on the hills and slopes can't get through the heavy clays and out of the bottom of the catchment quickly enough, causing the water table to rise.

The rising water table on the valley floor has mobilised salt and brought it to the surface. A small creek that runs through the 40 ha paddock drains the catchment and is now almost permanent, with a salinity concentration of about 4.5 deciSiemens per metre.

Managing the saltland

At the time we bought 'Easterfield', I had just started to read about increases in productivity achieved by rotational grazing compared with set stocking.

I had the opportunity to attend a *Grazing for Profit* school in 2000, and this turned out to be the catalyst for a complete change in the way we ran the two properties. We invested heavily in learning how to run an intensive rotational grazing operation, and we poured a lot of money into subdivisional fencing, new watering points and more sheep.

Our system is based on the principles of holistic resource management, which among other things recommends stocking small areas with large mobs over short periods followed by long rest periods. This enhances nutrient cycling and increases pasture productivity without high fertiliser inputs.

The system is working very well for us so far. Over the last four years we have rebuilt our business and doubled the number of sheep we are carrying, although this has been partly due to good seasons.

The saline and waterlogged land is run as a separate cell in our rotational system, and it performs a very important role in maintaining weaner growth in dry autumns.

At the moment we are running 4000 weaners on the 40 ha paddock, which is mostly paspalum, clover, and couch, with some redgrass on the less waterlogged areas. There is a bulk of feed and virtually no scalding even though the salinity concentration in water at the ground surface is about 4 dS/m.

The weaners are doing really well, and over a whole year we get about 200,000 DSE grazing days off the 54 ha of saline and waterlogged valley floor. This makes a very significant contribution to our bottom line, especially because of its feed value for the weaners.

We have noticed that despite the high saline water tables in the valley floor, gum and box trees are regenerating, and several native grass species such as redgrass and wallaby grass are coming back too. So we are not only getting big production benefits from rotational grazing involving long rest periods, but there are biodiversity benefits as well.

Future management

We have been really pleased with the way things have gone so far, but we have also been lucky. When we bought 'Easterfield', sheep were relatively cheap to buy and since then we have had mostly good seasons and a big increase in wool and surplus stock prices.

We have seen enough of the benefits from rotational grazing to want to do more. Over the next few years, we plan to introduce cell grazing using wagon wheel designs in several larger paddocks that have similar land types. The saline and waterlogged valley floor on Easterfield is one of the areas we have in mind.

Implementing a cell grazing system on our saline and waterlogged land will require large investments in fencing and watering points, and we will need to be careful in wet winters to avoid soil pugging and pasture damage. But we are confident that in most years we can further boost production off this saline and waterlogged land.

Lachlan Campbell

Merino weaners on 40 ha of saltland at 'Easterfield'. Tree regeneration is occurring in foreground (Photo: John Powell)

Case 3

Production from salt-tolerant local native species

David and Jill Millsom
Mt Hope
Pyramid Hill, Victoria

Photo: Jo Curkpatrick

Business Profile

- Location: Pyramid Hill, Victoria
- Area: 506 ha
- Mean annual rainfall: 320 mm, winter dominant
- Enterprises: Wool; cereals
- Landform and soil types: Granite outcrop, sand - sandy loams, red clay loams (saltland)

Key Points

- **Many local native grasses and chenopods are salt-tolerant**
- **Seed treatment of saltbush and seeding into raised mounds, not sowing hardware, gives us best results**
- **Quality feed in summer, no autumn feed gap**
- **Decreased costs and increased enterprise diversification**

The farm

Our property of 506 hectares is situated 18 kilometres north-east of Pyramid Hill. It has been held by the family for many years. The majority of the farm is located on the Terricks Ridge, a large granite outcrop and the balance runs down to the flat riverine plain where we have 80 ha of saline land. The natural vegetation is grassy woodland on the granite and black box woodland on the plains.

Our farm enterprises until 1999 were primarily wool growing from a self-replacing Merino flock of 971 head, producing 21.9 micron wool. In recent years our cropping program has expanded and we produce between 65 and 80 ha of winter cereals, predominantly malting barley, wheat or triticale on shares with our neighbour, Neville Miller. Neville has also run the flock since 1999 as Jill and I both work off the farm.

We have a strong interest in the natural environment, and since taking over the farm in 1983 we have made a concerted effort to integrate native vegetation into the farm as a way of achieving sustainable land use. A family and business goal to enhance the natural diversity of the property has also influenced our approach to land management, including the productive use of saltland.

The salty part

The 80 ha of our plains country had been saline for a long time prior to the introduction of our saltland pastures. This meant that 16 per cent of the farm was producing virtually nothing. The motivation was to get on and make it productive and in 1992 we started our on-going program.

The saltland had a shallow water table at 0.75 metres below the soil surface and soil salinity between 6.5 and 31. 5 deciSiemens per metre. This meant that part of it was moderately salty, growing salt-tolerant species like sea barley grass but the rest was extremely saline with extensive areas of salt encrusted bare ground.

One thing that we observed with great interest was the presence of several native species including wallaby, spear and windmill grasses, various chenopods and samphire. All had obviously evolved strong to extreme tolerance to salinity and colonised niches where salt concentrations fitted their tolerance levels.

Merinos on established saltbush stands at Mt Hope (Photo: Darrel Brewin)

Establishing the saltland system

With our low rainfall, heavy soil type and great seasonal variability it was important to choose species that would survive, persist and produce under grazing, and given our ecological principles, be as diverse as possible. The great thing was that many of these species were already present. We resolved to add to them and establish a grazing system that encouraged their colonisation and productivity.

District observation showed that the conventional exotic saltland pasture grasses, tall wheat grass and puccinellia, did not persist under grazing in our climate of extremes. There is also strong evidence that these species can be environmental weeds, particularly around wetlands.

Our main choice was another local native species, old man saltbush, and the last 12 years have confirmed this as the backbone of our system.

From 1991-96, using a mechanical planter, we transplanted saltbush 'speedlings' grown in our own nursery. In 1991 we successfully trialed direct seeding of old man saltbush, and since 1993 we have been involved in the development of direct seeding of multiple species of chenopods. On saline clay soils we use an "M" profiled seeding mound and find that the earlier the better for sowing, with dry sowing possible on these clay soils.

A thorough leaching of old man saltbush seed pre-sowing is essential and treatment with smoked water also greatly enhances its germination and that of most chenopod species.

We have also found that local native species will colonise the saline sites if management practices suit them. For example, wallaby and spear grasses are winter/spring growers and set seed in summer, and since they live for about five years they need an opportunity to set seed to regenerate regularly and spread. This means that late summer and autumn grazing fits best and fortunately this regime also suits old man saltbush and our need for sheep feed. The regime also suits summer growing grasses like curly windmill grass and various other chenopods like blue bushes (*Maireana* species). This greater diversity of plants in the system makes it more resilient and reliable.

Complementary land management works

There have been a number of other important land management works associated with our saltland improvement program, including protective fencing, revegetation and earthworks. We started our soil conservation program in 1983-84 when we took over the farm and we were able to do more as saltland pastures came on stream from 1992.

Fencing to soil types is an essential management tool for the protection of our remaining natural vegetation and habitat, for reinstatement of native vegetation and general ease of stock control. For some years we have been re-establishing native vegetation along the break of slope and along the drainage lines. Some of our granite hill-slopes have been seriously eroded in the past and are now crossed by grade banks that control and carry excess water to dams.

Our existing natural areas are the most valuable native vegetation. We have a 32 ha fragile grassy woodland in the granite hills that is now only intermittently grazed by stock needing temporary shelter. In this area the natural flora and fauna, in particular the invertebrates, have flourished. We believe that the great abundance of native predatory wasps from this bush may have had a significant impact on pasture pests.

We would like to make the point that all of this work over the last 10 years has taken significant areas of land temporarily out of production, and further areas have reduced stock access or are permanently removed from grazing. Yet total sheep numbers have been reduced by only 14 per cent. This and our increased cropping program could not have occurred without the tremendous improvement in grazing capacity afforded by our saltland pastures.

We are fortunate from a stock water perspective, as an irrigation channel flows through the property, giving us a plentiful, high quality supply.

Lessons learned

Old man saltbush is the backbone of our system, improving our saltland stocking rates from 0.2 DSE/ha to 2.0 DSE/ha. In terms of feed quantity, one old man saltbush is worth one grazing day for one sheep. Furthermore, faecal egg counts show that running our sheep on saltbush has eliminated their worm burden.

This system has allowed us to undertake broader land conservation works through increased carrying capacity and allowed us to diversify into share-cropping. It also allows us more flexibility to reduce the pressure on one area of the farm and increase it on another.

The last 10 years progress with establishing old man saltbush has come from a better understanding of the biology and treatment of the seed, rather than improvements to the sowing hardware.

Local volunteer native species have evolved strong salt-tolerance and we can use them productively in our saltland systems. Rotational grazing at the right time is the key to their persistence and productivity, and further research should focus on a range of these species.

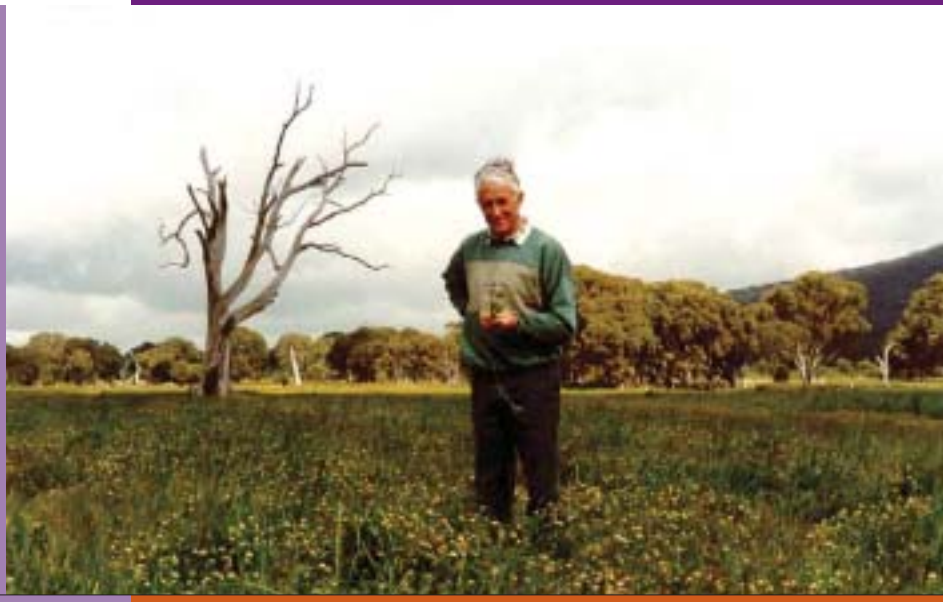
David and Jill Millsom

Les Payne, 'Coolanure' – Flowering Balansa and Persian clover in spring (Photo: LeeAnne Fairbairn)

Case 4

Green feed in dry times

Les Payne
'Coolanure'
Victoria Valley



Business Profile

Location: Victoria Valley, Dunkeld, Victoria

Area: 545 ha

Mean annual rainfall: 650 mm, winter dominant

Enterprises: Wool; growing out weaner beef heifers

Landform and soil types: Flat valley - sandy loam over clay and loamy clay on saltland

Key Points

- **Quality feed in summer**
- **Save six weeks of supplementary feeding**
- **Spell other paddocks at the break**
- **Enterprise diversification**

The farm

Our home farm lies in a flat valley of the Wannon River catchment and is surrounded on three sides by the rugged vista of the Grampians Ranges. Our two enterprises are a self-replacing Merino flock of 3300 head producing 20-micron wool, and 66 weaner beef heifers that are purchased, grown out and sold. The property, made up of two separate blocks, runs sheep on the home place and cattle on the other and today we carry around eight dry sheep equivalents per hectare.

The salty part

When we bought the home farm, 65 hectares of lower floodplain was waterlogged and salinised and grew virtually nothing. Significantly, this was about 20 per cent of the home farm and nearly 12 per cent overall. We really needed to make the saltland productive, so 12 years ago we embarked on a program of improvement.

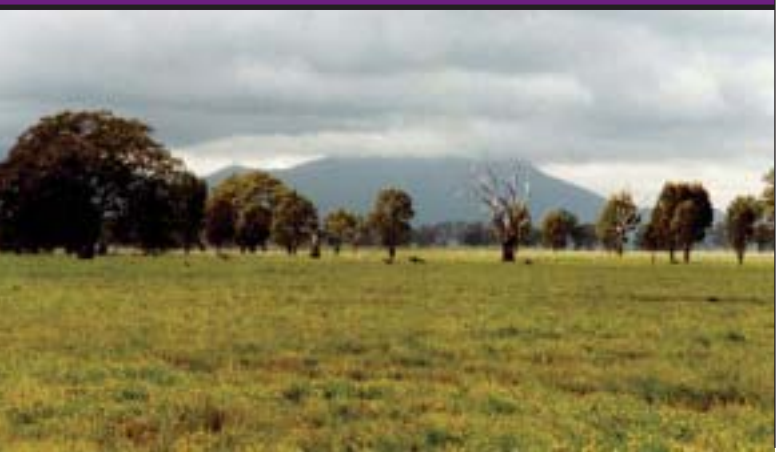
The land was seasonally waterlogged, with a shallow saline watertable of 28 deciSiemens at 0.9 metre depth and soil salinity between 7.2 and 12.4 dS/m. This meant that the land varied from totally bare to patchy areas of salt-tolerant species like sea barley grass, buckshorn plantain and yellow button.

Establishing the saltland system

Establishing saltland pasture is doubly risky when waterlogging and salinity sit together. If the land isn't saturated, it's crusty and unstructured. Our approach was to manage the waterlogging first. We created lines of parallel surface drains by disc ploughing in lands in the direction of the drainage and prepared a 50 milimetre deep seedbed.

Initially we were unsure about the capability of salt-tolerant pasture species to establish, so we sowed a seven ha test site of Tyrell tall wheat grass. We allowed this test site to grow through two summers ungrazed, in the belief that this was needed to achieve establishment. Although this effort resulted in an excellent stand and gave us confidence to tackle the main area, what we achieved was an excellent establishment of rank and hardly palatable tall wheat grass. We learnt that tall wheat grass is more robust than expected.

'Coolanure' saltland pastures - tall wheat grass, Balansa clover and Persian clover (Photo: LeeAnne Fairbairn)



For the main site of 35 ha we chose a mix of Tyrell tall wheat grass, Paradana Balansa clover, Kyambro Persian clover and Demeter fescue which was autumn sown. The tall wheat grass, Balansa and Persian established very well but there was little sign of the Demeter.

Provided that tall wheat grass plants' roots are firmly anchored they will handle light grazing in the first season. We now aim to keep the young plants grazed to a height of 100 mm with light grazing in late summer and autumn. That's the tall wheat grass - a perennial. For the annual clovers, both balansa and Persian, it is essential to allow strong flowering and seed set for future viability. As soon as flowering starts stock are removed until seed set has occurred.

Post-establishment, the saltland paddocks are rotationally grazed for up to eight months in the average season. The grazing schedule is May and June with wethers followed by a winter break from grazing, ewes in October and November with a December grazing break allowing for seed set, and then January to April with ewes to bring the pasture down to a height of 100 mm. This allows the clovers the opportunity to get a good start from the opening rains and winter grazing break.

It is important to note that we don't graze young growing sheep on the saltland as the water quality of the dams in this area becomes too salty for weaners and hoggets. Mature sheep have a much higher tolerance to salt concentration in drinking water.

Lessons learned

The lessons that come to mind are related to fencing, fertilising, species choice, water supply and grazing.

Fencing is the greatest cost in saltland improvement and it is important to go wide to encompass the saline area and allow for some spread. Keeping out of the salt also maximises the life of the fence.

Our initial fertiliser applications were too light, as the paddocks were highly deficient in phosphorus and potassium, not having been fertilised for 20 years. We now use super and potash at 100 kilograms per hectare to maximise production, particularly from the clovers.

Demeter fescue established poorly and did not persist in the pasture and I would not include it again.

Matching the quality of the water supply to the class of stock is essential on saltland pastures. The adult sheep are able to handle the dam supply without ill effect, however our weaner sheep rapidly lost condition on the saltland pastures due to their intolerance to the same level of salinity in their drinking water.

Our observations over the years have led us to change our grazing practices to maximise the use of saltland pastures. These include changing to rotational grazing and managing the grazing of tall wheat grass to a leafy and nutritious 100 mm in height for most of the year. The latter provides an opportunity to defer grazing on the wider farm at the autumn break.

Production and financial opportunities realised in the farming system

The 'out of season' feed from saltland is more valuable than conventional supplementary feeding, particularly as it enables paddock spelling and deferred grazing at the seasonal break. From January to April pregnant ewes graze the saltland pasture with very little supplementary feeding, whilst reducing the pressure on other paddocks.

The other significant contribution of the saltland pasture is that we have increased our annual stock numbers by 25 heifers.

Fencing and pasture establishment have been expensive, but with 12 per cent of the farm salt-affected the potential value of 65 ha of saltland pasture could not be ignored, and we are very satisfied with the results of our investment.

Les Payne

A happy producer with cows and calves in spring! (Photo: James Darling)

Case 5

Saltland as a profitable resource

James Darling
'Duck Island'
Keith, SA

Business Profile

Location: Upper South East of SA

Area: 3643 ha

Mean annual rainfall: 450 – 500 mm

Enterprises: cattle breeding and fattening

Soil types: sand over clay

Key Points

- **Salt is a natural part of our landscape**
- **Saltland pastures form the corner stone of a productive grazing enterprise**
- **Salt can be managed to minimise its impact**

The farm

The opportunity to develop this part of the Upper South East came when River Murray water became available via the pipeline to Keith in the early 1970s.

When I moved to 'Duck Island' in November 1976, it totalled 4860 hectares of which only 250 ha was cleared land. In 1978 I began a four-year landclearing program and developed a further 700 ha. Even in those days, saline swamps and the rise of salt on mismanaged flats were clear signs of the potential salinity risk in the area.

In 1980, 1620 ha of 'Duck Island' was added to Gum Lagoon Conservation Park, whilst in 1985 I purchased an additional 360 ha of largely cleared land adjoining 'Duck Island'. Development at 'Duck Island' was guided by the aim of establishing a functioning economic unit while preserving as much native vegetation as possible.

In 1976 the original 250 ha of variously cleared 'best land' was in three disconnected parcels kilometres apart. The need to establish the most logical design on the ground was paramount. The design laid out in 1977-78, guided by principles of minimum impact and minimum management, is largely the one that has been realised 25 years later.

The cleared land has been kept in the proportion of two-thirds flats to one-third sandy rises, mirroring the proportions of the area's native vegetation and wetlands.

Learning to live with saltland

Until 1983 'Duck Island' ran sheep and grew good cattle. Seasons, markets and income were always uncertain, if not precarious. Between 1976 and 1982 there was cattle depression, drought, regular bushfires, massive floods, then drought again with the blue-green aphid thrown in for good measure.

In the early days there was little information available on salt-tolerant pastures, but the first four hectare trial of puccinellia in 1978 was sufficiently promising to incorporate it in the seed mix for wet country pasture. There were also extensive areas where tall wheat grass and strawberry clover prospered. Shaftal clover grew magnificently but failed to persist.

From the outset I was aware of the presence of salt, but nothing had prepared me for the volume of water of the massive 1981 floods when the depth of inundation, beginning late June and lasting until September, drowned out every single acre of low ground pasture on 'Duck Island'.

A contour of strawberry clover lay, broken by waves and blown like seaweed, around the edges where the floods met dry land. It was a baptism - not of fire - but of water. And salt. As the water receded salt was sucked to the surface by the warming sun. All efforts to alleviate the problem only made it worse and became lessons of what NOT to do.

Cows and calves on puccinellia in late January (Photo: James Darling)

The one saving grace for the animals was that notable areas of reworked drowned ground grew a prolific atriplex, which became their main fodder source as 1981 turned into the drought of 1982. To manage, one third of the cows were sold. 'Duck Island' purchased over 2000 sheep, mostly wethers, for an average of less than $3.00 to generate income for 1981-82 and 1982-83.

The last sheep were sold in 1983 and from then on 'Duck Island' became focused on high performance crossbred cattle using a saltland management system that included the harvesting of puccinellia seed.

Always the major source of income, cattle were sold through the fat markets or direct to abattoirs or feedlots. Later, supermarkets became strong buyers. Crossbred bulls have been sold for more than 10 years in the SA Stud Beef Field Days. And more recently, especially since the purchase of 2000 ha of adjoining land known as 'Naberoo', the focus of sales is the premium EU (European Union) market.

Managing saltland

The most important single factor in saltland agriculture is keeping a cover on saltland over the heat of the summer. 'Duck Island' saltland pasture systems have been developed by observation. Observation is the most essential tool of land management and it entails that you are able to see what you don't want to see.

After the 1981 floods, there could be no illusions about salt. The failure of all pasture species except areas of puccinellia underlined the urgency to use the plant to its best ability.

Puccinellia lengthens the season, providing predictable and quality cattle feed especially during the hardest season of autumn. The later the floodwaters persist into spring, the higher the protein content and the better the feed value in the following autumn. All through the year puccinellia plays an essential role in a very healthy, simple and efficient cattle operation.

Weed control is crucial for successfully establishing puccinellia as the plant, like the seed, is tiny. Puccinellia is sprayed at 4 to 10 kilograms per hectare from an airseeder small seed box onto a lightly cultivated seedbed, the rate depending on the salinity level (higher salinity requires higher seeding rates) then rolled. Swamps, bare scalds and obviously saline areas are roughly cultivated and not rolled.

Seeding is done as soon as practicable after the break of the season and, where clover is not part of the seed mix, we have found no need to spray for red-legged earth mite. Trials at 'Duck Island' and on other properties in the Upper South East have shown the clear value of fertilising puccinellia. We apply between 100 and 150 kg/ha of superphosphate at establishment and 50 kg/ha of 19:10:0:13 annually to established stands. Not having a salt-tolerant legume to complement the puccinellia, we have also found a spring application of urea at 50 kg/ha useful, particularly for seed production.

All pastures are rotationally grazed and new puccinellia pastures are not grazed until the following autumn. Properly managed, we can expect to get 15 years from a puccinellia pasture before it needs renovation.

Recently we have recycled nutrients on the flats, using anchor chain dragged between two tractors to break up and spread the moist cow pats.

Saltland agriculture as the farming system

Two thirds of 'Duck Island' becomes flooded in an average wet year. To operate in these conditions, there is an extensive system of elevated fence lines, laneways and vehicle tracks that also serve as levee banks and which tie in with shallow surface drains that keep water slowly moving through the system following natural drainage lines.

Management has always been flexible and opportunist to take advantage of the variability of the seasons and the economic conditions of the times.

Calving half the herd in the autumn and half in the spring encourages a cover on saltland over the summer as well as providing all year round sales opportunities.

'Duck Island' and 'Naberoo' now have more than 500 ha of pure puccinellia and over 1000 ha of puccinellia mixed pasture.

Non-wetting sand has been an obstacle at 'Duck Island' but spreading clay from saline swamps has been successful in assisting lucerne establishment. The sandy rises have generally been sown to veldt grass, although some have been sown to lucerne. At 'Naberoo' there are 550 ha of very productive lucerne.

Puccinellia was first harvested on 'Duck Island' in 1983. Yields have varied from 100 to 165 kg/ha depending on the season.

Aside from the obvious contribution that puccinellia makes to our productivity, it is also an essential tool in reclaiming salt-affected land. A dense sward of puccinellia reduces evaporation over summer, helps to keep the water table down and reduces the amount of salt drawn to the surface. 'Duck Island' would not have survived as a farming enterprise without puccinellia.

James Darling

Gordon and Neville Stopp with some of their Merinos (Photo: Bruce Munday)

Case 6

Integrating saltland into the whole farm operation

Gordon, Neville & Brian Stopp
'McNamara'
Keith, SA

Business Profile

Location: Upper South East of SA

Area: 3730 ha

Mean annual rainfall: 470 - 530 mm; winter-dominant

Enterprises: grains; oil seeds; pulses; lucerne seed; wool; prime lambs

Soil types: McNamara farm - shallow grey sand over calcrete on flats; deep sand on rises

Key Points

- **Saltland must be managed separately from other land classes**
- **Well managed saltland can be productive**
- **Grazing from saltland can be successfully integrated with other components of the farm business**

The farm

Our home farm, which we run as a family partnership, is about 10 kilometres north-west of Keith in the Upper South East. Of the 1500 hectares, about 1100 ha is continuously cropped, most of the remainder being sown down to dryland lucerne for seed production. Salinity is only a minor problem on the home property.

We have a further 2200 ha at our 'McNamara' block, about 15 km west of the home farm, and that is where the salt really is a major issue. This land was still being cleared up until the early 1980s, although it now retains about 480 ha of heritage scrub and about 310 ha of swamp, shelter and wasteland.

The saltland and learning to live with it

We first noticed salinity in 1981 when we had a very wet year not long after the blue-green aphid had knocked out most of the region's lucerne. At this time the flats at 'McNamara', until then the best grazing land, were reduced to bare scald and practically useless. This was followed in 1982 by the most serious drought for 40 years, putting great pressure on the sandy rises that were carrying the breeding flock we wanted to retain.

It was very difficult to manage this saltland back in the 1980s. Little seemed to be known about appropriate management practices and we 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.

'McNamara' is a grazing block where, for much of the year, we run our 3200 Merino ewes with lambs and 1200 hoggets. Despite its real management challenges, it now fits very nicely into our whole farm plan.

Of the 1400 ha of pasture on 'McNamara', about 400 ha is salt-affected. These are flats which generally occur as ribbons between sandy rises or as larger areas surrounded by higher country. Most of these flats have water lying on them for a couple of months in a normal winter and the groundwater (about 12.8 deciSiemens) is only about 0.50 metres below the surface at the end of summer.

Puccinellia on the flats and lucerne (with a barley cover crop) on the higher ground. Relatively salt-tolerant Salado lucerne has been used at the break of slope. (Photo Bruce Munday)

Managing the saltland

We have completed a property management plan that aims to reduce groundwater recharge, manage the different land classes sustainably and provide productive grazing to complement our other farming enterprises. Most of the flats have been sown down to puccinellia and the larger areas fenced off so that they can be managed separately. Much of the higher country has been sown to lucerne with primrose and veldt grass on the higher sand dunes. Ideally we would fence off all the saltland as separate units, but this is difficult where it occurs as relatively small or narrow flats.

Over the years we have learned more about the value of appropriate weed control, fertiliser requirements and grazing management. Much of this new knowledge has come from our own trial and error, but also from a network of like-minded graziers in the Upper South East and the Primary Industries and Resources SA agronomists who have become involved.

Establishing puccinellia is now 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 it gets too wet. We scratch up the ground, spread the seed from a snail bait spreader and follow with a roller. The puccinellia responds well to fertiliser which we apply at 50 kilograms per hectare 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.

Establishing lucerne has been a challenge since the Hunter River variety was wiped out in 1978 by the blue-green and spotted alfalfa aphids and with the increasing incidence of non-wetting sands. However, we have had considerable success with Trifecta and we are now trialing Hallmark. Each year we try to increase the area under lucerne, so stabilising the sandy rises, reducing groundwater recharge and increasing the productivity of the property.

We have found that the key to success with lucerne is firstly to spray-top in spring, particularly to remove silver grass. After a knockdown herbicide we sow late winter into furrows 25 centimetres 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 USE and we will try this if we can locate suitable clay nearby.

A frustrating feature of much of our land is the break of slope between the sandy rises and the flats. This potentially productive part of the landscape is too high above the water table to support puccinellia but too low for lucerne once its roots reach the saline groundwater. We are currently trialing Salado lucerne in this area because of its relative salt tolerance.

Saltland as part of the farming system

Puccinellia has proved to be an excellent pasture for our sheep. It provides a nutritious seed-free environment for weaners before shearing in November and quality dry feed in autumn to extend the paddock rotation when the lucerne is becoming less active. The one thing that is really lacking is a truly salt-tolerant legume.

'McNamara' is relatively cheap land. Managed carefully, it provides very good sheep breeding country. With its combination of flats and hills, abundant shelter and perennial pastures we achieve 120 per cent lambing with cross-breds and 100 per cent with Merinos. Cross-bred weaners can be brought back to the more productive home property and finished on grain and lucerne stubbles. In this way it nicely complements our cropping and seed production enterprises.

Gordon, Neville & Brian Stopp

The "before" situation at 'Rutherglen' – saltwater couch in foreground, dying trees in the valley (Photo: Michael Lloyd)

Case 7

Productive saltland pastures assists whole farm management

Mark Samwell
'Rutherglen'
Boyup Brook, WA

Business Profile

Location: South-West Western Australia

Area: 1458 ha

Mean annual rainfall: 500 mm

Enterprises: sheep (wool, prime lambs); beef cattle; canola and cereal cropping

Landform and soils: clay in the valleys, gravel and loamy gravel on the slopes

Key Points

- **Saltland pastures increase farm productivity**
- **Fencing off saltland is the first step**
- **Surface water management is critical**
- **A wider variety of salt-tolerant plants is needed**

The farm

I farm about 1450 hectares in the Kulikup area, 32 kilometres east of Boyup Brook in the south-west of Western Australia. My farm is part of the Boree Gully Catchment Group. About 90 per cent of our rainfall is in the winter and I have noticed that annual rainfall is decreasing, the summers getting cooler and the winters warmer. The drier conditions are also causing more frosts and generally later in the season.

The farm is typical of the region, hilly with well-defined valleys, the original vegetation being flooded gum on the flats, with jarrah and white gum on the slopes, but little understorey other than prickle bush and poison bush.

Initially about 32 ha of the farm was salt-affected, about 10 per cent severely and 60 per cent moderately. This area eventually spread to about 60 ha, now all under salt-tolerant pastures. The salinity of the groundwater is 23 deciSiemens and at a depth of about 0.7 metres to 0.8 m under the saltland. Some of the deep piezometers show a positive reading of about one metre, indicating saline water under considerable pressure.

In the beginning

When the land was first cleared and developed we ran about six dry sheep equivalents (DSE) per hectare, but it didn't take long for the salt to spread from the salt flats in the bush to the cleared valleys, bringing the stocking rate in these areas down to zero. It appeared that there was a lot of water running off the slopes, ponding in the valleys and raising the water table and causing the salt problem.

When we realised the importance of surface water management we put in about 15 km of grade banks. These banks can be up to a metre deep, as it is important to get down to the clay to line the channels so that water doesn't leak into the groundwater. We generally put them in to that depth with a bulldozer at a cost of up to $1000/km, but it is well worth it as we need to keep the water moving along into the natural drainage system.

My grandfather initially planted some puccinellia on one of the salty patches years ago, and this has spread, including down the creek which the neighbours see as an asset. I have also experimented with other saltland species like tall wheat grass, saltwater couch, phalaris, strawberry clover, Balansa and Persian clovers. I am now doing some work with the Department of Agriculture, trialing various plants to see which grow best in different conditions.

Puccinellia and saltwater couch provide valuable cover (Photo: Michael Lloyd)

Initially I didn't really expect to get much grazing or production from the saltland, just stabilise the area, stop it from spreading and arrest the erosion. It was really only a band-aid approach. I also planted a lot of trees in the valleys, but they are all dying now from the rising salt. When we planted the trees we thought it was the right thing to do to stop the salt, and in fact we had some financial assistance for it. We now know it doesn't work, so it is disappointing to see some farmers still planting trees in the salty valleys.

Fencing is important

The Boree Gully Catchment Group was initially very effective in getting farmers interested in doing something with these salty areas. Grants obtained through the group greatly assisted farmers like me to begin some of our saltland pasture establishment.

One of the things I first did was to fence off these salty areas to control the grazing, manage the plant growth and stop the sheep getting bogged in winter. We now put some sheep in there straight after shearing to keep them warm and give them a boost, and we also graze wethers there in the autumn. Rotational grazing on the saltland pasture helps its regeneration, but we don't run the cattle on the saltland because they bog up the creek land and break down the trees.

Benefits of saltland pastures

Unfortunately the water table is still rising even with these perennials growing, which is why it is important to manage the surface water. It is also difficult to keep the water flowing down the creeks, as the gradient is slight and straightening the creek and removing snags and logs would not be approved. Since developing the saltland, we have increased our cropping from 140 ha to 430 ha and our cattle numbers from 100 to 220. While we have reduced sheep numbers from 7000 to 5100, we have maintained wool production through improved genetics.

Productive saltland has contributed to this increase in productivity by allowing us to better manage the whole farm. Combined with the cattle and cropping, the saltland gives us an opportunity to spell pasture paddocks as needed and put grazing pressure on the annual pastures to stop seed set for cropping.

Having seen the benefits from the saltland pastures, I would proceed faster if starting again and even borrow money for saltland if necessary. However, I would like to see a greater range of plants available for saltland, particularly species that use up more water. I doubt that saltbush is the answer here in our rainfall, but I am still keen to learn more about how to best manage my saltland and the slopes that allow the recharge.

Mark Samwell

Ian Walsh at 'Merildin', Cranbrook, WA

Case 8

Saltland revegetation – production and diversity

Ian and Joan Walsh
'Merildin'
Cranbrook, WA

Business Profile

Location:
North Stirlings, South-West Western Australia

Area: 1457 ha

Mean annual rainfall: 450 mm

Enterprises: sheep (wool, prime lambs); cereal cropping

Landform and soils: saltland – flat valley floors with sand over gravel/clay

Arable: gently undulating loams with some dolorite

Key Points

- **Rapidly rising water table was putting the whole farm at risk**
- **Saltbush and wattles can lower water tables**
- **Increased saltland productivity means increased farm productivity**
- **Seed production allows diversification**

The farm

Joan and I farm 1457 hectares in the North Stirlings area of Western Australia, near Cranbrook. Our family purchased the original 1000 ha property in 1957 and at that time 200 ha was bush, whilst a further 260 ha was saltland with the groundwater measuring about 18 deciSiemens per metre. In 1974 we bought an adjoining property on higher land without any salinity.

We now run about 2500 ewes plus lambs and hoggets, a total of 5000 dry sheep equivalents (DSE), mainly for wool, and sell prime lambs. We also crop about 400 ha in a rotation of one-year annual pasture and one-year crop.

The problem

Back in the late 1970s and early 1980s, as more and more of the original farm became saline, we realised that we really needed to take some action. Some puccinellia had been planted on the saltland but was not growing particularly well and the water tables were continuing to rise, in some cases to within 0.9 metres of the surface, putting more land at risk. The soil structure was also starting to decline, and aside from the loss of production, we noticed the trees were dying and native birds and animals disappearing.

By the mid-1980s we were running nearly 6000 sheep, a total of 7000 DSE, and cropping 90 ha. The pressure on the pastures was immense, and with more land going salty our assets were declining, the remnant bush suffering and we could see that we were becoming unprofitable and unsustainable. We realised we had to turn the salinity problem around.

The beginning of the way back

In 1984 I read about the work that the Department of Agriculture was doing with saltbush, trailing different varieties, establishment techniques and grazing management. It sounded exciting so I rang the author, Clive Malcolm, to find out more. Initially Clive was cautious, as most of the work had been done further north in the warmer areas of the wheatbelt, and he thought it might be too cold and wet down here. However he agreed to come and talk with us.

Seven-month old saltbush planting replanted on original saltbush area (Photo: Ian Walsh)

Getting started

The local North Stirlings Land Conservation District Committee agreed to a direct seeding trial of various saltbush species suggested by Clive, including *Atriplex amnicola, A. nummularia, A. semibaccata, A. lentiformis and Maireana brevifolia*. Eventually six of us collectively bought a direct seeding machine to sow saltbush on our properties. Initially, we didn't see any need for drains, because we believed the saltbush would take care of the water. However with the mounding in the direct seeding process we could see ponding occurring, so we installed 'W' drains to manage the surface water.

The saltbush did eventually lower the water table from 0.9 m to about 2 m in some places, which of course has allowed better growth of the clovers and grasses. We had planted Balansa clover back in the early 1980s and the saltbush really helped that along. The saltbush paddocks now provide good feed during autumn when it is scarce, and make a significant contribution to the total feed on the farm. Like most farmers, we now crop a lot more and run a few less sheep, but those sheep are concentrated on a smaller area than before, thanks to the extra production from the 180 ha of revegetated saltland.

What we have achieved

Seventeen years down the track the water table is significantly lower and we are ploughing out some of the older scraggly stands of saltbush and planting cereal crops. Last year one of these yielded 2.5 tonnes per hectare, something that would have been impossible before. We are also re-sowing some of the older saltbush areas with more saltbush, whilst some areas near the shearing shed have been really hammered and need renovation.

As our system has evolved, we have gone away from block plantings to alley arrangements allowing vehicle access for top dressing and mustering. There may also be opportunities to extend this further to allow seeding machinery between the rows in some parts of the farm.

Joan and I were also concerned at the loss of biodiversity due to the salt, so we have fenced off the natural bush and direct seeded native trees and shrubs to improve it. The revegetation of the saltland and management of the scrub has meant less wind erosion, protection for the sheep from cold winter winds and the return of native animals.

Looking ahead

We knew little about saltland management when we started and we have learned a lot by trial and error – and there were a few errors! Starting again now we would have much more information to guide us, but there is still a need for more research to develop better systems.

The wool industry went through a trying time in the 1990s, but having the saltland pastures to run the sheep on has enabled us to increase the cropping and still keep a good sheep flock. It also helped us to manage wool quality by having a better supply of feed in the autumn.

As a sideline, we are now developing specific areas of saltland for commercial seed production, not only for saltbush, but also for other native trees and shrubs. I am on the committee of the Saltland Pastures Association that is developing a plan to revegetate one million ha of saltland in the WA wheatbelt. This project, known as 1MPULS>, will need large quantities of seed and the involvement of many other farmers.

We also see the possibility of saltbush lamb as an environmentally friendly, clean green product that could find a niche market, and we are working with a consultant to help develop this. Overall, we believe there is an important future for saltland and we hope that more farmers will see it as an asset.

Ian and Joan Walsh

Tony York in SGSL pasture trials at 'Anameka Farms', Tammin, WA (Photo: Land , Water & Wool)

Case 9

Saltbush and bluebush – a magical mixture

Tony and Simon York
'Anameka Farms'
Tammin, WA

Business Profile

Location: Central Wheatbelt, WA

Area: 9400 ha (4300 ha cropped)

Annual average rainfall: 325 mm

Landform and soil types: heavy loams and clays in the valleys, slopes are sandy with granite ridges

Enterprises: sheep (wool, meat from culls), wheat, barley, lupins, peas

Key Points

- **Fencing to control grazing is essential**
- **Fresh water and dry feed needed with saltbush**
- **Well-managed saltland can significantly improve whole farm production**
- **More research needed into species, management and animal performance**

The farm

Our farm of 9400 hectares is situated in the Tammin area, just seven kilometres north of the town. Tammin Shire has a reputation for being the shire with the highest percentage of salt-affected land in Western Australia – and with 2000 ha of it on our farm, I can vouch for that!

The land here is very flat in the valleys surrounded by gently undulating slopes, the original vegetation associations being salmon gum, gimlet and morrel. Although about 75 per cent of the annual rainfall comes in the winter, we also need to use the summer rainfall so that it doesn't get into the groundwater. And that water table is a problem! Under the saltland, it is only 0.75 metres down and at a salinity of 74 deciSiemens per metre. The arable land is not much better with the water table at 2.5 m depth and 33 dS/m.

In the dark ages

Back in the early 1980s we were running 4000 ewes, selling wether lambs and cropping around 3200 ha – and we had about 1000 ha of bare salt scald. The rest of the saltland, another 1000 ha, was in varying degrees of natural regeneration along with a little planted bluebush. Now we run 5000 ewes, again selling the wether lambs, and crop 4300 ha. So you can see we now run an extra 1000 ewes and crop an extra 1100 ha. That is what I call production! I must admit that part of the extra production comes from the introduction of peas and lupins into the cropping program, but the saltland pastures are certainly a significant factor. As you can see, we are pretty excited about it now.

But it wasn't always like that. Back in the 1970s we could see the land becoming more useless, with large areas flooding in the winter and white glaring salt in the summer. The sheep would walk across the area and camp on the bare salt scalds, preventing any hope of natural regeneration. When we started to fence these areas off, it didn't take us long to realise that this was the single best thing we could do for saltland. Since then there has been quite a lot of slow natural regeneration.

Well-grazed bluebush, trough for piped-in water, and hay as supplementary feed (Photo: Michael Lloyd)

The good news

Clive Malcolm and others from the Department planted some bluebush and saltbush trials on the heavy salty flats in the early 1980s. The bluebush thrived on the well-drained areas, so we harvested some of the seed and spread it around the farm. It has now colonised most of the heavy soils on the farm and the road verges, but again it was slow. Maybe I was impatient, but I thought there had to be something better than this.

In the early 1990s we had heard of the successes of other farmers with direct seeding, and indeed Clive was a passionate advocate, so we tried direct seeding saltbush and grasses, mainly puccinellia and tall wheat grass. The results were a spectacular failure! After the three attempts, we decided that our heavy clay soils do not suit direct seeding and we opted for seedlings instead. Success at last!

A new beginning

Since then, we have planted about 100,000 seedlings of saltbush and the results have been encouraging. We generally get a good survival rate and the sheep can graze the areas after a year or so. We also have more grass and medics returning to complement the saltbush. Last year we tried some Frontier Balansa clover, but the season was unkind. However we know of others who have had success with Frontier, so we will try again this year.

I can illustrate the grazing potential with the example of a 150 ha paddock we bought about 10 years ago. There was about 8 ha of arable land, the rest salt, and in pretty bad shape. Initially we grazed about 50 dry sheep on the area for about three months each year. Since then it has been revegetated with bluebush and saltbush and we run 300 lambing ewes in there over a four-month period each year. Not a bad effort for land that many people would consider useless.

Of course, not all paddocks are as good as this one. Another paddock was planted to saltbush four years ago, and there is still virtually no grass or clover understorey. This means we can really only get limited grazing from the area, as the sheep need the grass to complement the saltbush. To get better production we will have to bring in hay or straw, or maybe just open the gate to the stubble paddock next to it. We've also heard of some trial work with cocky chaff and straw from the header that we will follow up.

Water supplies

Clean fresh water is necessary, as any salt in the water will reduce the amount of saltbush the sheep eat. Our water comes from the Comprehensive Water Scheme and is piped to and throughout the farm. However this is becoming fairly expensive, so we are developing some fresh water soaks on the higher slopes, using solar pumps to supply water to the sheep on saltland.

A valuable asset

We feel that saltland is very beneficial to our farming enterprise. It makes the sheep enterprise more robust, with more options for grazing. The whole farm is more productive and we can spell some of the arable land at the break of the season, putting sheep on the saltbush to allow pastures on the arable land to get away. We are certainly not afraid of buying saltland, because well managed it can be a valuable asset.

All of this has been a gradual learning experience for us – a case of 'suck it and see'. There is still a desperate need for more research into species for saltland, both annual and perennial, management practices and information on how animals perform on saltland. We are very willingly contributing to the Sustainable Grazing of Saline Land project by providing an area of land for the core research project that recently commenced in WA. Needless to say, we are looking forward to the new knowledge that will come out of this and the confidence it will give farmers who are managing saltland.

Tony and Simon York

Bluebush in foreground, saltbush in centre, with trees planted on the edge of arable land on the fenceline (Photo: Michael Lloyd)

Saltbush and wattles – ready for harvest
(Photo: Michael Lloyd)

Case 10

Saltland pastures fill the autumn feed gap

Ashley Lewis
'Jimco'
Wickepin, WA

Business Profile

Location: South-West Wheatbelt, WA

Area: 1250 ha (600 ha cropped)

Mean annual rainfall: 325 mm

Enterprises: wheat, wool, Merino lambs and shipper wethers

Landform and soils: saltland – sand over clay

Arable - loam; sandy loam over ironstone

Key Points

- **Do it right the first time**
- **Saltland pastures can fill the autumn feed gap**
- **Lower water tables lead to more feed and greater profits**
- **There is much to be learned from the experiences of others**

The farm

Our farm is situated east of Wickepin and we belong to the Woglin Catchment Group, a part of the Facey Group. The area has a Mediterranean climate with about 80 per cent of our rainfall in winter and we run a mixed farming operation with about half the arable land in crop each year. Sheep graze the crop stubbles and annual pastures as well as the saltland.

Saltland...as it was in the beginning

When I came home to the farm from school in 1984 there was already about 150 hectares of our 740 ha property saline. My father was concerned about the salinity problem and had already written to government ministers expressing these concerns. My father has certainly been my inspiration to really get involved in salinity issues.

I had been at the Narrogin Agriculture School and I was keen to start doing something too, but in those days we were unsure just how to go about it. We could see the lower lying areas becoming saline, although at that stage only about 10 ha was actually bare ground. Another 100 ha had patchy barley grass, and we could see it would not be too long before that too was saline. Dad had put in a levy bank in the 1970s to stop water from the creek flooding over a large low lying area, and this seemed to be effective.

At about the time I came home from school there was a lot of publicity about WISALT banks, a systems of banks and drains promoted to prevent salinity, and there was a lot of pressure on farmers to install these. Although we could afford it, dad could not see that they would have helped in our situation. With hindsight, I am glad he took that line, because it encouraged us to look at what proved to be much better options.

We sensed that there had to be ways to get some better grazing from this land, but at that time there was little information available to us on how to go about it.

Wavy leaf saltbush with seed on – ready for harvesting (Photo: Michael Lloyd)

Starting the road back

Over the next two years I spent eight months working for the West Australian Department of Agriculture. During that time I learned a lot about salinity, its causes, possible treatments and how to make saltland more productive. I was involved in some of the work at Lake Toolibin, assisting in organising field days and helping farmers with soil and water conservation measures. I also learned about direct seeding of saltbush and completed a Community Landcare Technician's course to assist me in advising farmers on saltland.

At that time I could have earned more money shearing, but working with the Department helped me understand how to get the best out of our saltland, and indeed from the whole farm.

Action on the ground

In 1986 I saw some successful saltland pastures in South Australia and then undertook some saltbush trials of my own. This prompted me to purchase a saltland seeder in 1989 and plant as much of our saltland as possible. It was also an opportunity to do contract seeding for other farmers and to harvest and sell seed from the saltbush.

I also experimented with other plants and found that one of the wattles, *Acacia saligna*, grew well on the saltland. The sheep can graze the lower leaves, while the wattle growing more than two metres high has plenty of upper leaves to pump the soil moisture. In fact, in one area the wattles have been so successful in lowering the water table that a dam that was once salty is now suitable for sheep.

In 1984 I started a tree nursery, growing mainly salt-tolerant varieties suitable for the edges of salty areas. When we finished in 1989 we were selling 50,000 seedlings a year.

Now we see the benefits

In 1996 I bought another nearby property, which has relieved the cropping pressure on the home farm. With the increased feed available from the saltland I have increased sheep numbers and eliminated hand feeding on the home farm. That saltbush and wattle certainly fill the autumn feed gap, making it cheaper to run those extra sheep and allowing more time for other things – including social!

I have fenced off the saltland so that it can be grazed separately from the rest of the paddocks and water is reticulated from a key dam on the higher land.

For some time I had been concerned that there was not enough grass and clover amongst the saltbush and wattle, so I have tried Balansa and Persian clovers. These seem to be doing well, and it will be interesting to see how they persist, given the last two difficult seasons.

Where to now?

I have been lucky to have had a father who saw the value of saltland and inspired me to become involved and also to help others see its benefits. We have a lot of visitors here each year to see what we've done. We can show them the changes that have occurred with the revegetation: reduced erosion, lower water tables, saltland recovered, more birds and animals, and of course it looks so much better.

It is important that work in revegetating saltland is done properly. After all, when we put in a wheat crop we do it properly, so why not with saltland. I know I did some of my early seeding 'on the cheap' by not cultivating or controlling the weeds prior to seeding, and I have had to re-seed.

I would like to see more research into possible productive plants for saltland and how animals perform on them. As a contribution to the research effort, I am working with a PhD student, Kelly Pearce from Murdoch University, in a trial of the meat quality of sheep grazed on saltbush. Kelly has already completed her pen trials and is preparing for the paddock work on my saltbush.

Ashley Lewis

sustainable grazing on saline land

Sustainable Grazing on Saline Land (SGSL) is delivering a mixture of research and extension activities to woolgrowers and meat producers across southern Australia managing dryland salinity, including:

- **Communication aimed at building awareness that saline land can be managed profitably and sustainably, and that SGSL can help livestock producers better understand and manage their saline land.**
- **Financial and technical support to 120 grower groups across Australia to undertake some of their own, local investigations into what might work best for their situation.**
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- **Researching the relationships between productivity, profitability and sustainability of the various options available for saline land.**
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