

# Evolution of saltland management in the farm system

**J**ames Darling is a farmer and an artist. He is also a member of the South Australian Dryland Salinity Committee. Bruce Munday, when he interviewed James, was looking for useful tips about how to establish and manage saltland pastures. James agrees that this is an important story to tell, but believes that it is the collective experiences of many farmers in his region that should be brought together in a more substantial volume than this.

He also insisted that this interview be recorded on a much larger broadsheet. Bruce should have seen this coming - James has been a consistent voice arguing that salt is an unavoidable component of the Australian landscape and we need to learn to live with it. Given that, he then advocates the need for serious research into just what is the optimum proportion of salt-affected land in an environmentally and economically viable farming system.

Salt is a component of our soil profile - as natural as rocks.

From earliest association more than 40 years ago, through nearly 30 years of living at *Duck Island*, right up until now, I have always been aware of the presence of salt. But it was the 1981 floods, the largest single event in my farming career, that really drove home how destructive activated salt can be.

**Location:** Keith, Upper South-East of South Australia  
**Size:** 6600 ha  
**Mean annual rainfall:** 400–450 mm  
**Soils:** Sand over clay  
**Enterprises:** Composite cattle (Angus-Simmental-Poll Hereford) for premium EU market; breeding composite bulls; harvesting saltland seed



*Duck Island*, like so many other properties in the Upper South East (USE) watercourse country, lost every low-ground acre to the depth and duration of the 1981 floods - which then bared the ground mid-spring and activated the salt in summer.

Keeping a cover on saline ground through the heat of the summer then became our first axiom of high water table saltland agronomy. We

realised we couldn't get rid of the vast quantities of salt; instead we acknowledged its presence and aimed to bed it down - minimise its impact - manage it.

The next year was a drought. Country, drowning under a metre of water in 1981, had been dry-seeded in June '82 and was now blowing - nature administering yet another salutary lesson.

## Pioneering saltland agronomy

In the early 80s little was known about saltland agronomy. I was among a group of USE farmers who observed that puccinellia (*Puccinellia ciliata*) was the only plant that might persist in salt-affected and inundated areas for long periods. It became imperative to learn how best to use the plant. In a few short years this was to become the mainstay of *Duck Island's* agricultural system.

In 1983, a farmer-initiated field day at *Duck Island* to look at saltland pasture options revealed that the bigger issue was



James Darling with *Duck Island* composite steer that entered the feedlot at 14 months weighing 450 kg and grew at 2.2 kg/day

Photo: J. Darling

really water management. Not only would this impact on pastures, but it would also have a profound effect on bushland and wetlands.

This re-think of wider issues inspired a cohesive neighbourhood of landowners in the *Duck Island* watercourse to form the *Duck Island Watercourse Conservation Committee*. Backed by the Department of Agriculture at Keith, they set out ambitiously to implement a district flood mitigation scheme, halt the spread and reduce the severity of soil salinity, renovate the existing salt-affected areas, and preserve wetlands.

The committee was extraordinarily active on all fronts - meeting with the district councils, writing submissions to government ministers, surveying community attitudes, and conducting farm walks, open inspections, and the first unofficial field site trials.

In 1988 the committee secured funding to employ a soils project officer and to start

## Key points

- Salt is a natural part of our landscape and can be managed to minimise its impact
- Saltland pastures form the corner stone of a productive grazing enterprise
- A minimum input saltland agricultural system needs discipline and careful management



Photo: J. Darling

Spring herd on a saltland pasture – Duck Island pasture in January

water table monitoring, saltland management and group learning. Among other things, this project began the long, hard haul to get saltland agriculture treated as an important component of Australian agriculture and funded as such.

In 1996 I was founding chairman of *Saltland Solutions Inc*, - the first farmer-initiated organisation formed to promote saltland seed production and research.

At that time, the whole region became a research focus catchment for the *National Dryland Salinity Program* and is now implementing the *USE Dryland Salinity and Flood Management Program* - one of the largest natural resource management projects in Australia.

#### Profiting from saltland

*Duck Island* now has more than 500 hectares of pure puccinellia and over 1000 ha of puccinellia mixed pasture that can

include tall wheat-grass, strawberry and sub-clovers, phalaris and perennial rye. Balansa clover also performs well, particularly on wetter sites, but presents real management challenges. It is so vigorous that it can crowd out all the other pasture species, but then fails to set seed in spring, leaving bare ground the following year.

Throughout all this, the most important saltland pasture plant for our grazing enterprise undoubtedly continues to be puccinellia. Pucci is reliable, it lengthens our growing season, it is resilient, and it provides predictable and good quality cattle feed especially during the most demanding time of the year - autumn.

From a breeding herd of 950 cows, we aim to bring grass-fed steers to between 300 and 350 kg carcass weight within 15.5 to 19.5 months. These growth rates can only come about from good genetics, sound

management and productive pastures.

Cutting lucerne early for silage has proven to be a very effective means of conserving high quality fodder and controlling annual grasses and weeds.

Calving half the herd in the autumn and half in the spring has long been an essential feature of our operation. It spreads the grazing pressure, enables us to maintain a cover on saltland over the summer, and provides all-year-round sales opportunities.

Management at *Duck Island* has always been flexible and opportunistic to take advantage of the variability of the seasons and the economic conditions of the times. With the recent run of dry years we have even been able to successfully seed lucerne along with pucci on about 200 ha of previously wet flats. Until recently this would have been too risky as lucerne certainly does not appreciate wet feet.

“

Salt and its role in the Australian landscape is first and foremost a problem of culture, not agriculture.

The Australian landscape suffers from inadequate description. We have not understood landscape processes and we have not given due place and due regard to the make-up, the components, of our many and varied landscapes.

The highest priority in terms of environmental and educational need is an understanding of water table management. The component of the Australian landscape that has been most disregarded is salt. The two are inextricably linked. ”

James Darling, February 2003



Photo: J Darling

**Triangle 2** by James Darling and Lesley Forwood – The Esplanade National Performing Arts Centre, Singapore March 2005. 8 tonnes of mallee roots, 3.5 m (h) x 8.8 m x 1.0 m

### A manageable system

We value the native vegetation on *Duck Island* just as much as we value our agricultural land. About half of the property is native bush and we pay the same strict attention to its management, employing the flood-in flood-out surface water system that we use for the pasture.

Two thirds of *Duck Island* is watercourse country and floods in a wet year. In the early days at *Duck Island* it would flood about three years in five, but it must be said that we have not had 'a wet year' in the past six.

A critical issue for us has always been to find an appropriate balance between saline and non-saline land. *Duck Island* alone was always vulnerable, with a disproportionate area salt-affected. In this respect, acquiring the adjoining properties *Naberoo I*, *Naberoo II* and *Siberia* higher up the watercourse, in the period from 1991 to 2001, was a great step forward.

Salinity is much less of an issue on *Naberoo*, and adding this to *Duck Island* has given us far more flexibility in pasture management. It enables us to avoid undue pressure on the fragile hills when the flats are under water, and also allows us to maintain cover on saltland in summer. Just what proportion of saltland is optimum for a grazing enterprise is a research question still to be answered.

We have now renovated 400 ha of *Naberoo* with a very productive lucerne stand. The recent advent of 11 km of drain - part of the *USE Dryland Salinity and Flood Management Program* - has now further improved our opportunity for growing lucerne-based pastures on the flats.

*Duck Island* would never have survived as a farming enterprise without puccinellia. Now, notwithstanding drought, the expanded *Duck Island* is both economically and environmentally viable and makes a significant contribution to the overall health of the catchment.

### CONTACT

■ Bruce Munday  
CRC Salinity  
Communications Manager  
Tel.: (08) 8538 7075  
E-mail: bruce@clearconnections.com.au

## The science behind the story

### By Dr Nick Edwards

James Darling is a clear example of where researchers are following farmers in puccinellia management and utilisation. While James has developed a management system for puccinellia-based pastures that suits his enterprise and his saline land, like most producers in the area he has been unable to fully quantify the benefits from this system. This is where the *Sustainable Grazing on Saline Lands* (SGSL) research site at Mount Charles, only about 10 km as the drain flows from *Duck Island*, is benefiting the local farmers with this sort of saltland.

The SGSL research is putting some definitive production and economic figures to these pasture and animal systems. At the same time we are also trying to demonstrate a management system that will lead to consistent and reliable re-establishment of balansa clover in the pasture - an issue raised by James as a weakness.

A unique feature of the Keith-Mt Charles farming community is their keen interest in, and sustained support for the generation of new knowledge. An area where some of the results from our SGSL work already differs from the conventional wisdom is the use of nitrogenous fertilisers. Many local producers use no fertiliser on their puccinellia saltland, considering it to be low value, and therefore low input, farming land. Others apply low rates in the belief that they will maintain an adequate level of phosphorus in their soil and obtain at least some grass growth benefits from a low level of nitrogen. Results from our Mt Charles fertiliser studies indicate that low rates of N result in no pasture response whereas high rates of N result in very significant increases in productivity.

While these studies are continuing, initial indications are that rates of 25-50 kg N/ha in winter are likely to greatly increase pasture growth during this critical time of pasture shortage.

The ultimate test for farmers is not so much the increased productivity of their pastures but the economic bottom line for their grazing enterprise, and that is the area of our research that has everyone watching with interest.

• Dr Nick Edwards (SARDI) leads the CRC Salinity's subprogram Livestock Production on Salt-tolerant Pastures.

### CONTACT

■ Dr Nick Edwards  
Tel.: (08) 8762 9184  
E-mail: edwards.nick@saugov.sa.gov.au