Sustainable grazing on saline land in Western Australia – multidisciplinary research linking producers and scientists

H.C. Norman, D.G. Masters, M.G. Wilmot, A.J. Rintoul, R. Silberstein, E. Lefroy and T. York
CSIRO Livestock Industries, Private Bag 5, Wembley, WA 6913, Australia, Email: Hayley.Norman@csiro.au

Keywords: dryland salinity, animal production, participatory research, biodiversity, hydrology

Background Dryland salinity is one of the most critical environmental issues challenging Western Australian farmers. Currently 10% of the cropping zone (1.8 million ha) is salt-affected and this is predicted to increase dramatically in the next 50 years (NLWRA, 2001). Animals grazing saline pasture systems represent the most likely large-scale opportunity for economic return from saline land in the short to medium term. To date, few farmers have invested in large-scale revegetation of saline land as the economic return from grazing has not been perceived to cover costs. Furthermore other benefits of saltland pasture systems, such as biodiversity, water use and improved quality of animal products have not been quantified.

Profitable and sustainable grazing on saline lands in Western Australia – site 1 research project This project brings together several leading farmers with scientists from across a large range of disciplines to assess the impacts of saline pasture systems on water, salinity and biodiversity in addition to animal production and profitability. Producers, animal scientists, hydrologists, ecologists, agronomists and agricultural economists have worked together from project initiation through to experimental design and implementation. The primary research site is situated on a 10,000 ha sheep (5,000 Merino ewes) and cropping farm in Tammin, one of the most salt-affected parts of southwestern Australia. The producer is a leading advocate of saltland pastures and has revegetated nearly half of the 2,000 ha of saltland on his farm. The research is spread across 100 ha and divided into five treatments encompassing; unimproved volunteer saltland pasture, saltbush (*Atriplex* spp.) and volunteer pasture (typical of most saltland pastures in this area) and saltbush with a sown 'high quality' (legume) understorey (thought to be the best system for animal production). There are several areas where plant agronomists are testing new pastures species and demonstrating alternative options.

Returns from animal production are expected to be key drivers in the adoption of saltland pastures. The animal research aims to quantify the benefits of grazing saltbush-based pastures during the autumn when conventional annual pastures are of poor quality in mediterranean-type climates. Plant diversity, biomass production, nutritive value and selection by animals are key components of this research. Results to date suggest that substantial decreases in the cost of establishment of the pastures will be required to justify returns from animal production.

We aim to quantify the environmental impact of saline pasture systems on water, salinity and biodiversity. Two 25 ha plots of unimproved saltland were isolated to allow comparison of water run-off, salt loss, sediment and nutrient fluxes. After one year of measurement, one plot was planted with the saltbush and sown understorey system to allow measurement of any hydrological benefits of the saltland pasture system from establishment through to maturity. Data demonstrates that the saltbush pastures are using more rainfall than the unimproved pastures. This could have a large impact on the adoption of saltbush for recharge control on valley floors.

The biodiversity value of the saltland pasture treatments is being compared with adjacent remnant vegetation and unimproved saltland. The biodiversity research encompasses elements of landscape function (measured using a Landscape Functional Index), microbial respiration, invertebrate and plant diversity (species and functional groups). Preliminary data suggests that saltland pastures are botanically diverse. The modified saltbush plots have the highest levels of microbial biomass in the soil (a sign of soil health).

The research plots have been characterised extensively for cross-site comparison and to aid in the extrapolation of data to other farms. This project is one of four research projects operating over 12 sites across Australia. Synthesis of knowledge is being fostered through common protocols for site characterisation and data collection, a customised database and the development of national themes. Research outcomes are being communicated through field days, scientific publications and formal communication products such as brochures and books.

Acknowledgement This project is part of the national Sustainable Grazing on Saline Lands project supported by Land, Water and Wool, the CRC for Plant-based Management of Dryland Salinity, CSIRO and the Department of Agriculture, Western Australia.

Reference

NLWRA (2001). Australian Dryland Salinity Assessment 2000: Extent, Processes, Monitoring and Management Options. National Land and Water Resources Audit, Canberra.