

Implementation, participation and evaluation of a voluntary water quality protection program for grazingland owners and managers

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Introduction In 1990, California's range livestock industry began working with the state's water quality regulatory agency to develop a voluntary producer participation programme to protect water quality on privately owned grazinglands. In 1995 they implemented a voluntary programme of surface water protection supported by extension education and technical assistance conducted by University of California and USDA Natural Resources Conservation Service. Past studies have shown that education programmes are crucial to voluntary pollution control programmes in agriculture (EPA 1990) and that ranchers will change grazing management practices in response to extension education programmes (Richards and George 1996). The objective of this project was to conduct an extension education programme that facilitated water quality planning and implementation of water quality protection practices by range livestock producers.

Materials and methods To facilitate completion of water quality protection plans a Ranch Water Quality Planning Short Course was developed, tested and improved from 1994-96. Beginning in 1997 this short course was conducted for private grazingland owners throughout California. During the short course ranchers learned about (1) non-point source pollution associated with ranching, (2) state and federal water quality regulations and regulatory agencies, (4) basin water quality assessments, (5) self-assessment of pollution sources on their own property, (6) practices that protect water quality, (7) cost-share programmes, and (8) how to monitor pollution sources and practice effectiveness. Plans developed during the short course included: ranch descriptions, ranch goals, ranch maps, basin water quality status, pollution source self-assessments, existing and planned water quality protection practices and monitoring procedures. The short course curricula can be reviewed and downloaded from <http://californiarangeland.ucdavis.edu>. In 2002-2003 producers who participated in the short course were surveyed to determine their water quality protection activities following the short course.

Results From 1997 to 2004 more than 1000 producers attended 60 short courses in 31 counties. Two-thirds of those attending short courses completed water quality plans for their ranches totalling more than 500,000 ha. Two-thirds of the short course participants who completed the survey implemented water quality protection practices. There was a significant relationship ($p < 0.001$) between plan completion and practice implementation. Ninety percent of those who implemented water quality protection practices had completed ranch water quality plans. The majority of the respondents managed ranches less than 2000 ha in size. Half of the respondents raised beef cattle. We found that personal funds invested in water quality protection practices exceeded cost-share funds until costs exceeded \$2000. The survey revealed that initially respondents took the course to avoid regulation, but upon short course completion, became more proactively involved in controlling non-point source pollution because they found pollution sources during their self-assessments. Fewer respondents implemented a monitoring programme than implemented water quality protection practices.

Conclusions These results indicate that the range livestock industry initiated voluntary program supported by education, was an effective means for helping grazingland owners and managers to voluntarily address non-point source pollution on their properties.

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Profitable and sustainable grazing systems for livestock producers with saline land in southern Australia

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Introduction Dryland salinity affects over 2.5 M ha in Australia, mostly in southern states and is expanding at 3-5% per year (NLWRA, 2001). The prognosis is for considerable expansion of the area affected by salinity and waterlogging (12-17 M ha at equilibrium), because groundwater levels continue to rise and only small-scale land management programmes have been implemented. In addition, many waterways are increasingly saline, especially in the Murray Darling Basin and in Western Australia (WA). Sustainable Grazing on Saline Land (SGSL) addresses the need to make productive use of saline land and water resources. Its research component operates at 12 sites across WA, South Australia (SA), Victoria and New South Wales (NSW) and consists of coordinated activities that have regional relevance and contribute nationally. The programme seeks to develop and demonstrate profitable and sustainable grazing systems on saline land that have positive environmental and social impacts. Whilst there are different priority research issues at each site, data collection is governed by common measurement protocols for salt and water movement, biodiversity, and pasture and animal performance in order to make comparisons and data sharing across sites practical.

The research programme In WA research is spread across seven sites, representing about 4.3M ha of salt affected land. These include two large (about 50 ha) sites (near Tammin and Yealering) that allow comparisons between unimproved land and land improved to current best practice, using a saltbush (*Atriplex* spp.)-based system with and without improved understorey species. Other sites have been established at Yealering, Lake Grace, Wubin, Meckering and Grong Grong (NSW) to examine factors affecting the composition, growth, grazing management, utilisation and value of saltbush-based pastures to sheep. Saline areas in the upper south east of SA are subject to both severe waterlogging and inundation in winter, when rising groundwater brings salt to the root zone and soil surface, inhibiting plant growth, seed set and survival in spring and early summer. Research here is focused on a puccinellia (*Puccinellia ciliata*)-based pasture where the impacts of fertiliser and addition of balansa clover (*Trifolium michelianum*) into existing puccinellia stands are being assessed under continuous and strategic grazing. Maintaining the persistence of balansa clover is a key challenge. In Victoria the targeted areas are characterised by shallow water tables, which are often saline but where winter waterlogging and inundation are an added challenge. The research here is focusing on use of tall wheat grass (*Lothopyron ponticum*) and annual legumes to provide quality out of season grazing compared to unimproved pastures. The targeted areas in NSW, the Lachlan and Macquarie catchments in the central west of the state, are characterised by high and rising salt load and electrical conductivity levels and generally small discharge areas close to waterways. Research is assessing the impacts of a salt-tolerant, perennial grass-based pasture (tall wheat grass dominant), compared to volunteer/naturalised pasture, on pasture and animal production, and water, soil and salt movement off-site. All projects will be assessed for their impact on whole farm economics.

Conclusions This ambitious project is testing current best-bet options for animal production from saline land. Outputs will include clarifying the environmental impacts and quantification of the production and economic benefits of grazing saline land. Extension products to assist farmers to make better decisions about managing these land types will boost their confidence to incorporate more saline land into their whole-farm management plans for environmental, economic and social outcomes. A significant component of this national network of projects and sites is its links with, and the participation of, farmers through the research being located on commercial farms, the involvement of local advisory groups and formal and informal links with a national network of over 125 farmer initiated small-scale projects testing locally relevant options for managing saline land.

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