PROCEEDINGS OF THE AUSTRALIAN RANGELAND SOCIETY BIENNIAL CONFERENCE

Official publication of The Australian Rangeland Society

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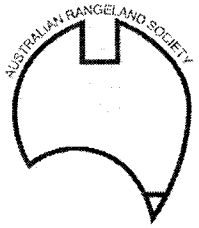

The Australian Rangeland Society

THE BIO-TROUGH PROJECT

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INTRODUCTION

The Western Australian southern rangelands region is located in a semi-arid climatic zone, with an average rainfall of between 150 and 250 mm (Holm & Burnside 1992). In order for livestock to survive, grow and reproduce in this dry environment, pastoral stations must provide artificial water supplies; approximately 90% of permanent water sources in the region are man-made (Cribb 1990). In many cases, the carrying capacities of stations are largely determined by the degree to which they are watered. Consequently, the supply of good quality and quantity water for livestock is a primary concern for the southern rangeland pastoral industry.

The most common type of animal watering point on stations is composed of a water supply, a storage vessel and a watering trough. Though this system has been relatively effective for many years, it has high operating and maintenance costs, particularly because of the need for regular trough cleaning to maintain water quality. The build up of sediments, and other contaminants leads to significant livestock production losses (Squires 1981). As an average property in the southern rangelands has 30 watering points, a large proportion of station time and resources are tied up in conducting millruns (trough cleaning is a primary task of the millrun). This is particularly the case during summer months when water is in high demand by grazing animals; twice-weekly millruns are common at these times. It has been estimated that 50% of station time and resources are tied up in millruns during summer (Rouda 1999).

The primary objective of the Bio-Trough Project was to find a practical and economical water quality treatment for livestock troughs, with a view to reducing costs associated with manual trough cleaning. Research by the author found that biotechnology has been successfully used as a cleaning aid in animal watering systems in rangeland environments overseas. Natural water-living organisms were placed within water points to maintain and improve water quality. Specifically, improvements were found in water clarity, dissolved oxygen, salt concentration and dissolved metals (Sainty & Jacobs 1994, Ingram *et al* 1997, Romanowski 1994). It appears that over time, a micro-environment is developed within the water point, leading to improved water quality characteristics.

Research indicated that biological organisms might also lower trough water temperatures, a significant factor in the desirability of water for livestock.

Consequently, the Bio-Trough Project sought to test the following hypothesis: *The use of biological agents in livestock troughs will maintain and improve water quality within those troughs as compared to control troughs without biological agents.*

THE WINNING TRIAL

Materials

A major task of the project was to select appropriate biological agents for the Western Australian rangelands. A literature review and liaison with plant specialists came up with the water plant Lake Club Sedge (*Schoenoplectus validus*) as ideal for use in the trial. This was because of its enhanced qualities as a bio-filter, its suitable physical shape and its robustness.

Round troughs were chosen as the type of trough to be used in the trial. Round troughs have a superior surface area to volume ratio as compared to the conventional long trough, and they present an optimal design for the installation of water plants – that is, water plants can be placed in the middle of the trough and effectively fenced off from livestock.

The Bio-Trough was trialed on Winning Station, a cattle and sheep station northwest of Carnarvon in the Gascoyne region. The trial troughs at Winning Station were circular concrete troughs, measuring 2 metres diameter by 75 cm height.

Methods

Initially, three trial troughs were set up, all from the same water source, Winning Dam. Two troughs were set up with water plants and circular weldmesh screens, while the third trough was the control, containing no biological agents.

The trial troughs were established on April 28, 2002. Baseline water samples were taken at this time from each trough and sent to AGAL laboratories for analysis. Water samples were analysed for the following:

- Conductivity
- Alkalinity
- Filterable iron, calcium, magnesium, potassium, sodium, aluminium, manganese
- Sulfate
- Nitrate
- pH
- Total suspended solids
- Boron and strontium.

A sampling regime was established whereby samples would be taken from each trough every six months and sent for analysis. Subsequently, three additional Bio-Troughs have been established on different water sources on Winning Station.

Preliminary Findings

At the time of writing, ten weeks had passed since the installation of the Bio-Troughs. Because of the timeframe laid out in the sampling regime, no subsequent samples were taken until the six-month time period had elapsed. However, the trial sites had been recently inspected and a number of findings had emerged:

- There was evidence of significant plant growth of Lake Club Sedge in both trial troughs. Stem diameter had increased markedly and plants appeared to be in excellent condition. Some pruning by livestock had occurred above mesh screens, though no damage had occurred to plants as result.
- In both trial troughs there were a number of aquatic organisms present, including frogs and small aquatic insects. This may indicate that a micro-environment was in the process of being established in the trial troughs.
- Turbidity of water was significantly lower in both trial troughs than the control trough. Water clarity in Wylajugga trough in particular was exceptional.
- The manager of Winning Station intended to install Bio-Troughs on as many waters as possible on his station based on his observations of the success of the trial thus far.

The next step in the Bio-Trough Project is to conduct water samples as specified in the sampling regime. This will provide quantitative results than can be used for discussion and conclusion. The forthcoming water sample analysis will also coincide with the summer period on Winning Station, when livestock are watering heavily. Current indications are that the Bio-Trough will be an effective and cost efficient water quality treatment for livestock troughs in the southern rangelands.

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