WaterSmart Pastoral Production™ – A demonstration and evaluation of innovative stock water delivery and management technologies in desert Australia

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INTRODUCTION

The Desert Knowledge Cooperative Research Centre's (DKCRC) WaterSmart Pastoral Production™ Project was established in 2005 with the aims of (i) encouraging pastoralists to understand how optimise the benefit of rainfall; (ii) assist them to understand the mechanics of and make informed decisions about technologies for water pumping, reticulation and remote management and control of water systems; and (iii) promote knowledge of water-point placement in relation tactical grazing, environmental sensitivity and biodiversity. This presentation focuses on the second of these objectives.

Pastoral enterprises in desert Australia are characterised by low input/low output production systems operated across extensive areas of land. Many properties are greater than 50 000 ha in size. Beef production in the Northern Territory occurs on extensive properties with an average size in excess of 3 800 km^2 and stocking rates of 1 head to the square kilometre or less (Oxley et al 2006). Paddock sizes are large (>3 00 km^2) and typically have two to four watering points in the form of bores with tanks or turkey's nests for storage. Normal management involves physical inspection of watering points 2-4 times per week and our research found that pastoralists travel 200-700 km per inspection. The WaterSmart Pastoralism project demonstrated and evaluated technology capable of remotely monitoring (eg, water levels, flow rates, animal activity) and controlling infrastructure (e.g. turning pumps on and off) at a watering point. These technologies reduce the need for physical inspections to once a week, achieving improved water management coupled with reductions in fuel and labour costs.

Evaporation and seepage control devices were also installed on two properties to investigate how practical and applicable they were to pastoral enterprises. This also allowed for the opportunity to quantify the time required to install the technology and make it operational. This paper outlines the benefits of the technologies and problems that arose during the project.

MATERIALS AND METHODS

The remote management technologies being investigated for this study are three different commercially available telemetry systems which collect information and transfer it using UHF radio up to 70 km to another location. The data being collected to assess these systems includes the cost of purchase and installation, cost of water monitoring pre and post installation and the effectiveness and reliability of the equipment. Data was also collected to quantify the time and distance savings resulting from the telemetry installations. Five properties were involved in the study and are summarized in Table 1.

Table 1. Properties included in the study

Property	Size km^2	Principal livestock type	No. Remote Management Technology water points / Total	Remote Management Technology Cost	1st year indicative saving	Cost recovery period
Napperby, NT	4452	Cattle	14 / 29	$80,000	$39,000	24 months
Mt. Ive, SA	852	Sheep	7 / 14	$25,000	$35,000	8.5 months
Monkira, Qld	3730	Cattle	10 / 10	$40,000	$25,000	18 months
De Rose Hill, SA	1800	Cattle	4 / 31	$25,000	$0	N/A
Quinyambie, Qld	12119	Sheep	11 / 32	$36,000	$73,000	6 months

Two types of evaporation control devices were installed on the study sites. At Monkira, a floating polyethylene cover was installed over a round, earth walled dam. At Mt. Ive, evaporation was reduced from a dam through the installation of floating device constructed from used car and truck tyres which reduces the surface area exposed to direct sunlight and also reduces the wind speeds passing across the water. A seepage control device in the form of a dam liner was also installed at Monkira. The liner was constructed from 0.75 mm polyethylene and was plastic welded to form an impervious barrier between the water and the soil below.

RESULTS AND DISCUSSION

As Table 1 shows, in most cases the repayment period for the technology is less than two years, and in the longer term remote management is likely to increase the profitability and economic sustainability of the stations. De Rose Hill station has not yet achieved any cost savings as the remotely monitored watering points are located on the route to other watering points that still need to be inspected, resulting in no reduction in distance travelled. All stations in the study have increased the number of times that they monitor their watering points, It is also likely that the producers will be able to use the time saved through this technology to improve other aspects of their station management.

Native and feral animals caused damage to some components of the telemetry system through damaging exposed wires and components. This resulted in the systems temporarily ceasing operation but was rectified through the construction of sturdier housing units which minimised the level of exposed wiring.

The evaporation control surface liner experienced some bird damage resulting in small holes exposing the water to direct sunlight. As the holes were small in size there was no apparent increase in evaporation from the dam. The seepage control device was exposed to cattle walking on it following cattle breaching a fence. While not recommended by the manufacturer no damage to the liner was observed.

CONCLUSIONS

Remote management technology can be utilised in arid rangeland pastoral production systems to reduce the cost of production and improve management of a scarce resource. Furthermore, remote management technology can allow for increased monitoring of stock watering infrastructure leading to better production and animal welfare outcomes. Incorporating new technologies into the stock watering systems of pastoral stations offers the enterprises the opportunity to reduce the cost of providing and monitoring supplies.

REFERENCES

Oxley, T., Leigo, S., Hausler, P., Bubb, A. & MacDonald N, (2006) Pastoral Industry Survey NT 2004, Department of Primary Industry, Fisheries and Mines, Northern Territory Government

www.desertknowledgecrc.com.au/watersmart