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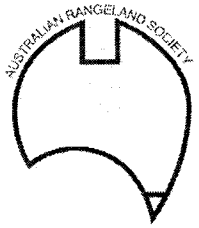

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NIPPIDRINK - A NOVEL WATERING DEVICE FOR FREE-RANGING LIVESTOCK

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ABSTRACT

This paper describes the progress towards developing a practical and cost effective alternative to the water trough currently used in extensive sheep operations. Though functional, troughs are not very efficient as significant amounts of water are lost during routine cleaning and evaporation. Further, troughs require constant monitoring and maintenance to ensure they operate effectively. Nippidrink technology may prove to be a practical and cost effective alternative. The device consists of stainless steel nipples, similar to those used in the pig rearing industry, connected in series to a water delivery pipe. It is recognised rangeland applications will need to operate under conditions considerably different to those in a rearing shed, but the proposed Nippidrink system may provide a reliable supply of fresh water and be virtually maintenance free. Further, Nippidrink may greatly enhance the control and dispensing of nutritional/medicinal products and soluble lures (aniseed/salt) to keep stock on waters equipped with trap yards all year round, even when there is large amounts of paddock surface water. Nippidrink may also promote the control of small feral pests that threaten biodiversity as elevated nipple height may prevent them from exerting adequate nipple pressure to effect water let down. Protocols have been developed to help rangeland sheep learn to use Nippidrink and development work to obtain the optimal design specifications for various types and classes of livestock is in progress.

INTRODUCTION

Research into novel watering devices for free-ranging stock has not progressed significantly since the introduction of the watering trough (Rouda, unpublished data). This system, though functional, is not very efficient as water is lost through evaporation and routine cleaning (estimated at approximately 6,200 litres per year for each standard 3-metre trough), and troughs require constant monitoring and maintenance to ensure they operate effectively. Even if information technology soon becomes available to remotely monitor water troughs, producers will still need to visit their troughs to clean them. Trough maintenance costs producers an estimated $15,600 –20,800 every year, and if this could be reduced, profitability would increase by an estimated $10,000 annually.

In April 2000, members of the Nullarbor Eyre Highway Land Conservation District Committee (LCDC) received PIRD funding from Australian Wool Innovations to develop a watering device that ensured grazing livestock had reliable access to quality water, free of algae and other contaminants. Low capital investment, reduced maintenance costs and ease of animal training were key considerations. LCDC members worked closely with scientists attached to the Centre for the Management of Arid Environments (CMAE) to design and test an innovative stock water delivery device, now known as Nippidrink (Nd).

MURESK TRIALS

Nd development was initiated in May 2000 at the Muresk Institute of Agriculture at Northam in Western Australia. Four trials were conducted to establish preliminary design features and animal training requirements of the Nd system (Krebs et al. 2000). The Muresk prototype consisted of 18 mm polypipe fed from the mains connected to 40 mm PVC piping, 1.8 m long and slanted (600mm at one end and 400 mm at the other, off the ground). The nipple delivery system was developed along the line of PVC piping. The line consisted of 500 mm lengths of PVC connected with threaded T-sections for attaching nipples, with a 40 mm cap at the end. Nipples where attached to both the front and back faces of the PVC piping at an offset spacing of 50 mm, and directed downwards at a 25 degree angle. Initially the nipples were made to drip by jarring their toggle open using a rubber band and sheep fed a mixture of chaff and lupins containing 10 grams of salt learnt to use the nipples in less than one hour,

suggesting induced thirst provided an ideal incentive for accelerated learning. Sheep preferred the higher positioned nipples.

STATION TRIALS

The first of two station trials was conducted in July 2000 on a 2 sq km holding paddock at Noondoonia Station, situated 200 km east of Norsemen WA. One hundred sheep of mixed age and sex were used. The nipple line was fixed in place at a slightly modified height with the lower end at 350 mm and upper end at 750 mm above the ground. Each T-section had a spacing of 250 mm and the nipples were placed alternatively, i.e. 500 mm between each nipple on the same side of the pipe and 250 mm between nipples on the opposite to offset eye contact between sheep drinking on opposite sides of the pipe. The delivery pipe was 50 mm industrial polypipe (threaded at either end) with 50 mm industrial poly T-sections threaded in all three directions. A total of 21 nipples were placed along the line giving a total operational length of 11 m. It took approximately 3 days for the entire flock to learn to use the nipples. Again, preference for the higher positioned nipples was observed and significant water wastage was noted at the lower end of the delivery system, suggesting increasing the height of the nipple pipe would be advantageous.

The second station trial was conducted at Fraser Range Station, 100 km east of Norsemen in mid-July 2000, to test and refine the design for commercial applications. A Nd device, modified in accordance with the Noondoonia findings, was installed in a 4,900 ha paddock containing three conventional water troughs spaced 3 km apart and 600 merino ewes with lambs. The Nd replaced one of the established troughs, which was completely disabled. The Nd tested on Fraser Range was 700 mm at its lower end and 110 mm at its higher end. Plastic netting was placed under the pipe line to prevent animals from moving under it and angle iron was attached to the upper side of the pipeline to reinforce its strength and provide shading. There were fewer support pipes used and a pressure regulator set at 7 psi was installed in line. Despite the other two troughs remaining functional, mobs containing as many as 300 sheep of various ages were observed using the Nd system within a week of it being installed. Observations indicate animals again showed a preference for nipples located at the higher end of the pipe. The small amounts of water regularly found under the nipple pipe suggested further modification of the nipple design was required to reduce wastage.

BENTLEY TRIAL

The station trials indicated that more work was needed to improve Nd's efficiency and reduce water wastage. Therefore another set of experiments were conducted at the Bentley Campus of Curtin University of Technology in early 2002 to determine water flow rates and optimal pressure ranges for rangeland applications (Chung et al. 2002, unpublished data). A 2 m long nipple pipe with 4 nipples attached 500 mm apart was used. A 45 l drum fed water to the pipe via an 18 mm hose. Results indicate a 2.9 m gravitation gradient was needed for the enough water to flow through the nipples to achieve a one litre per minute delivery rate. Further, the results suggested flow rates were not affected by the number of nipples activated at any one time. What was critical was the amount of water entering the nipple pipe that had to always be more than the quantum of water being discharged through the nipples. This finding has important implications for the length specification of the nipple pipe. As long as the cross sectional area of the input pipe remains greater than that of the output areas, the device should function effectively. This suggests drilling nipples directly into existing station reticulation piping, providing these are at an adequate height for animal access, may be practicable.

FURTHER STATION TESTING

Another group of station tests are planned to start towards the end of August on Hill View and Polelle Stations near Meekatharra WA. These will be designed to determine actual animal intake rates, optimal nipple configuration, height, inclination and design to eliminate water wastage. Further, the functionality of the nipples with varying water quality will be examined and the effect of ambient temperature on nipple temperature (and animal use) will also be assessed.

CONCLUSION

The trials conducted to date have provided encouraging results. We anticipate Nd will present a simple solution to a long-time management problem and result in a multitude of benefit to producers. These include better animal performance as Nd may provide a reliable supply of fresh clean drinking water to livestock, free of algae and other contaminants and also greatly improve the control and dispensing of nutritional/medicinal products and soluble lures to keep stock on waters equipped with trap yards even after a large down pour of rain. Nd may reduce production costs by saving rangeland producers the cost of regular cleaning and maintenance. Finally Nd should reduced water wastage that results from evaporation and the routine emptying of troughs during the cleaning process. The simplicity of Nd suggests once producers become familiarised with the concept, most would be capable of building their own units. This will undoubtedly result in a multitude of variations in designs and applications (various classes of sheep, cattle & goats; in-series connection to water medicators).

REFERENCE

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