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UNDERSTANDING THE PREFERENCE OF CATTLE FOR SHADE AND WATER

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ABSTRACT
Natural resource management (NRM) groups have been co-funding the removal of cattle from riparian zones by installing fences and off-stream watering points. Riparian areas provide not only a source of drinking water but also a source of shade and fodder, thus it is not clear how important each of these are. Early work has shown that providing access to off-stream water (e.g. a trough) reduced the amount of time cattle spent in riparian areas by up to 80%, implying that access to water is a major reason why cattle frequent the riparian area but not the sole reason. The objective of this experiment was to compare cattle activity in areas where shade and water are co-located, shade and water are located separately and where water is present without shade to investigate their preference for shade and water. The experiment was conducted at Belmont Research Station (150º 13´E, 23º8´S), located 20 km NW of Rockhampton. Water trough and/or shade structure combinations were randomly positioned in the paddocks. Initially, three groups of ten Brahman steers (*Bos indicus*) were fitted with GPS collars and assigned to one of the three paddocks. All three groups of cattle were moved between the three paddocks during the period from October 2011 to January 2012. Cattle were observed from a distance regularly and had *ad-libitum* access to grazed forage and trough water throughout the experiment. Preliminary results from the experiment are presented and the implications of these results on riparian zone monitoring work discussed.

INTRODUCTION

There are approximately 4.5 million cattle grazed in catchments along the Great Barrier Reef with the greatest numbers in the Fitzroy and Burdekin catchments (Source: Great Barrier Reef Marine Park Authority). Development of a beef cattle industry in Northern Queensland involved the conversion of woodland to pasture. As a result the Great Barrier Reef is exposed to increased levels of terrestrial sediment and organic matter caused by woodland removal, overgrazing (particularly in drought conditions) and stream bank erosion. Regional natural resource management (NRM) groups are co-funding the removal of cattle from riparian zones by installing fences and off-stream watering points to protect environmentally sensitive riparian areas from overgrazing. However, there is little published literature on how cattle use riparian areas and what the benefits of these methods are in reducing the direct impact of cattle on riparian areas. Further work is required to explore how animals use riparian areas with and without access to off-stream water.

As part of the Paddock to Reef Rescue Program (an Australian Government funded program to monitor, model and report on the health status of water entering the Great Barrier Reef), the Fitzroy Basin Association (FBA) in collaboration with CQ University and CSIRO are investigating how cattle use riparian areas to understand the impact of cattle on water quality. Riparian areas provide not only a source of drinking water but also a source of shade and fodder, thus it is not clear how important each of these are. Early work has shown that providing access to off-stream water (e.g. a trough) reduced the amount of time cattle spent in riparian areas by up to 80%, implying that access to water is a major reason why cattle frequent the riparian area but not the sole reason.

Recent advances in GPS technology (high fix rates) can provide producers and researchers with the tools to accurately determine where animals are in the paddock (Swain *et al.*, 2007; Wark *et al.* 2007). The objective of this experiment was to compare cattle activity in areas where shade and water are co-located, shade and water are located separately and where water is present without shade to investigate their preference for shade and water.

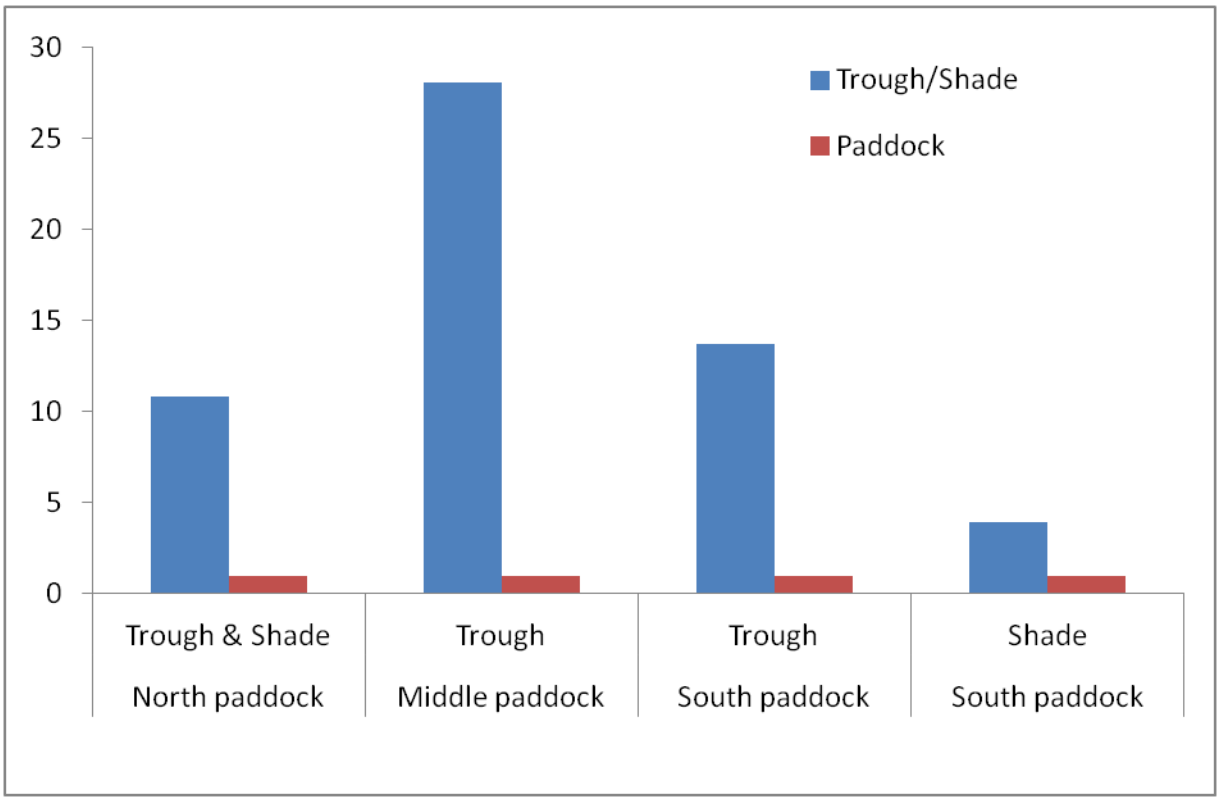
MATERIALS AND METHODS

The experiment was conducted at Belmont Research Station (150º 13´E, 23º8´S), located 20 km NW of Rockhampton. Three 6 ha irrigated paddocks were used for this experiment. Water trough and/or shade structure combinations were randomly positioned in the paddocks. The water trough and/or shade structure combinations implemented were water and no shade, water and shade at different locations and water and shade at the same location. Initially, three groups of ten Brahman steers (*Bos indicus*) were fitted with CSIRO high sample rate GPS monitoring collars and assigned to one of the three paddocks. After three weeks the GPS monitoring collars were removed and the archived data retrieved for storage and analysis. All three groups of cattle were moved between the three paddocks during the period from October 2011 to January 2012. Cattle were observed from a distance regularly and had *ad-libitum* access to grazed forage and trough water throughout the experiment.

To quantify the preference of animals for any given area (e.g. a riparian area) the landscape preference index is calculated. Landscape preference index (LPI) is defined as the proportional time spent in the area of interest divided by the proportion of the area of interest compared to whole area available. A LPI of one means that the cattle are using the area in proportion to its relative availability, that is, they are not selecting for or against the area. A LPI of greater than one indicates that the cattle are preferentially selecting the area and a LPI of less than one indicates the cattle are actively avoiding the area. Cattle location data was used to calculate landscape preference indices for the area around the shade and/or water structure. For shade structures a 10 m radius was used and for water troughs a 5 m radius.

RESULTS

Figure 1 shows the daily average landscape preference values for the water trough and/or shade combinations for all three deployments. Cattle have selected for water troughs and/or shade structures in all paddock across all deployments with the exception of shade alone in the south paddock of deployment two. However, the relative importance of water troughs compared to shade differs throughout the day (data not presented here).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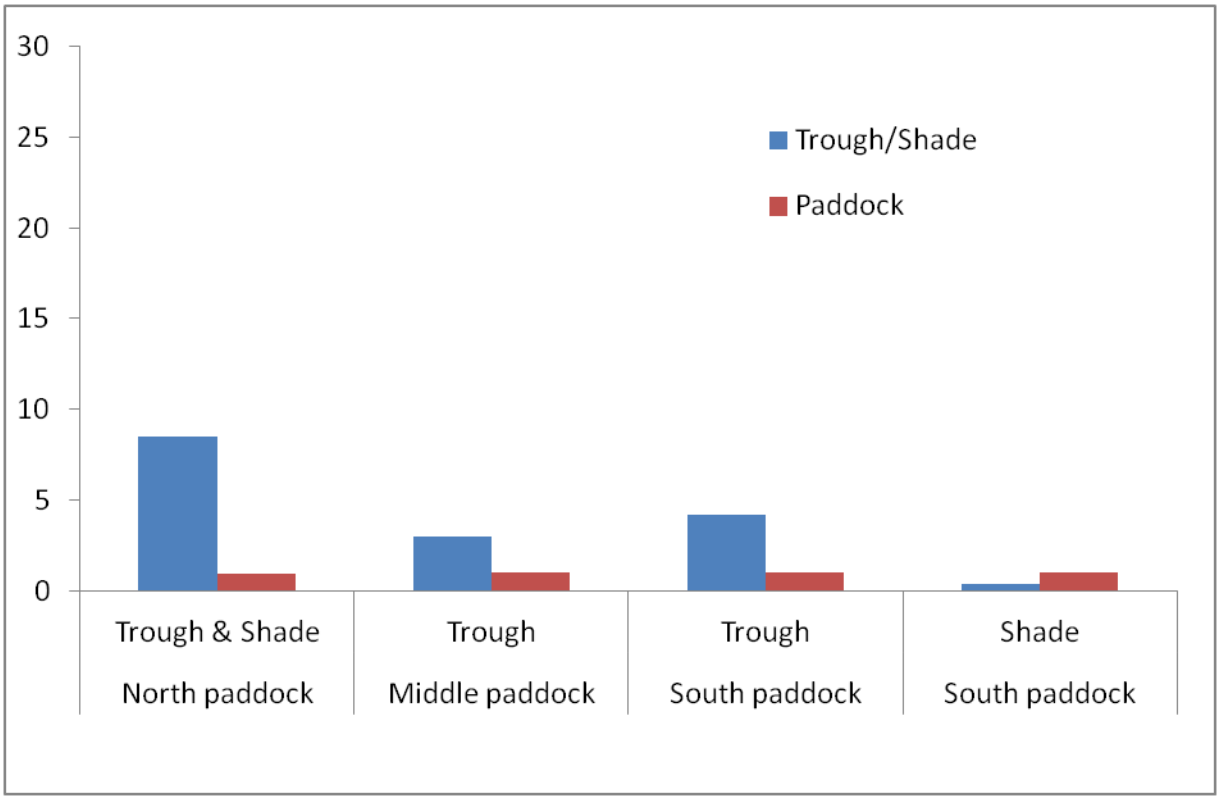
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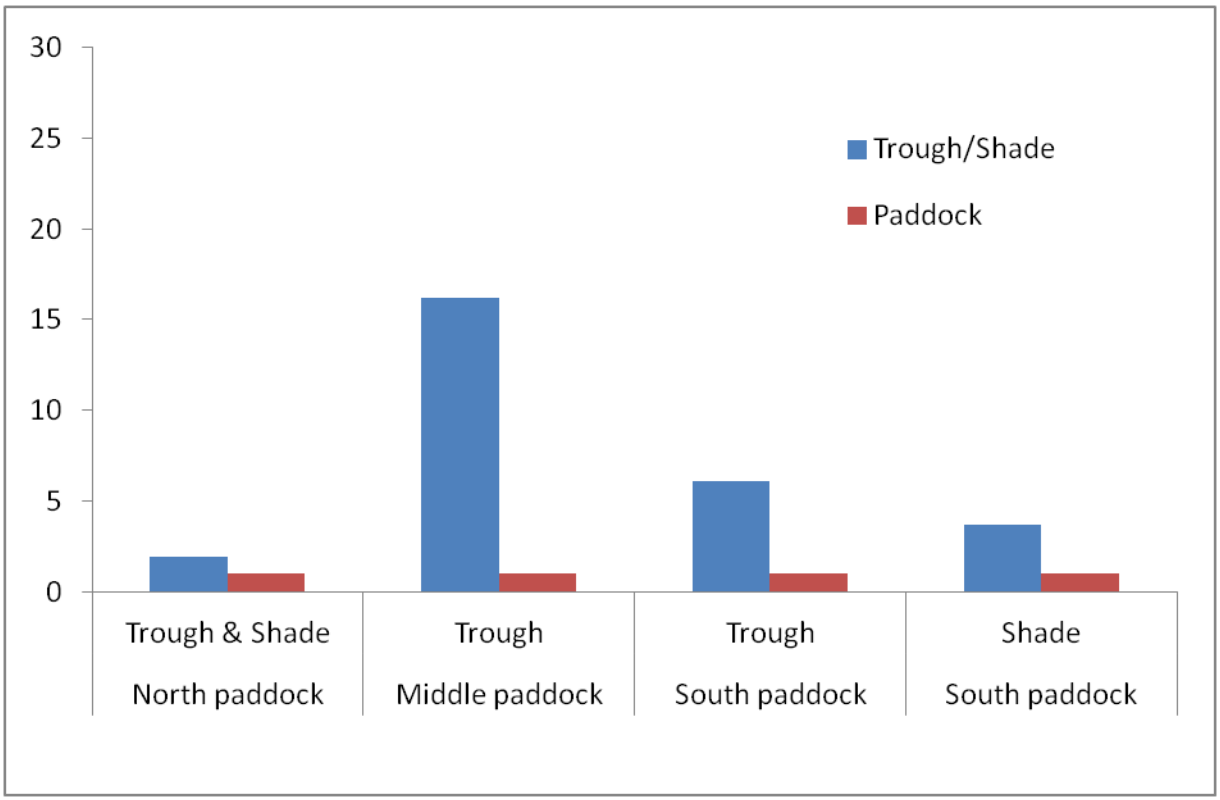

Figure 1. Daily average landscape preference indices for water trough and/or shade combinations for deployment 1 (top), deployment 2 (middle) and deployment 3 (bottom). Water trough and shade structure are at the same location in the north paddock, the middle paddock has a water trough only and the south paddock has a water trough and shade structure at different locations.

DISCUSSION

This short paper presents a preliminary look at the results from a replicated experiment with the objective of investigating the relative importance of shade and water to cattle. Riparian areas provide animals with both shade and water and it is difficult to apportion the relative importance of these when they are combined. In general, cattle selected for those areas of the paddock associated with water troughs and/or shade structures and in particular water troughs. Further analysis of the data showed that the cattle preferred the water trough over the shade structure during the morning daylight period and the shade structures in the afternoon day time period. Furthermore, the authors are interested in exploring new analysis techniques and metrics to identify changes in behaviour over time identified using high sample rate GPS.

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