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# HERBIVORES BEHAVING BADLY - PADDOCK SCALE SPATIAL PATTERNS IN PLANT-HERBIVORE INTERACTIONS

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## ABSTRACT

While it is generally acknowledged that herbivores do not uniformly graze the range, little data is available on the spatial patterns of relative herbivore pressure at real paddock scales. Herbivore and plant patterns were examined as part of a larger study which assessed the impacts of changing the form of water distribution within a paddock, from a boredrain system to point waters (troughs). Spatial patterns in herbivore activity, biomass, defoliation and a herbivore pressure index (calculated as the ratio of herbivore dung:standing biomass) were analysed to examine the effect of changing the form of water distribution. This paper reports that herbivore activity was not spatially uniform and that the relative pressure exerted by herbivores was more heterogeneous than herbivore activity or biomass patterns alone would indicate.

## INTRODUCTION

In south west Queensland large areas are watered by boredrains, allowing animals extensive access to water. Conversion from boredrains to point waters alters water availability patterns, which influences patterns of herbivore utilisation, and hence influences vegetation and resource conservation. Understanding how herbivores distribute themselves across the landscape, is essential to our understanding of the effects of changing water distribution on production and biodiversity.

While it is widely known that herbivore distribution is not uniform across the landscape (e.g. Landsberg & Stol 1996), heterogeneity in grazing pressure has rarely been quantified and the actual grazing pressure or defoliation experienced by vegetation due to this heterogeneity of herbivore distribution at the paddock scale is less well known (Weber *et al.* 1998).

## AIM

To characterise factors influencing herbivore distribution and to determine the effects of changing water distribution from the boredrain to troughs, on herbivore and vegetation distribution at the paddock scale.

## METHODS

The 2000 ha mulga open woodland paddock 40km south east of Cunnamulla, was divided into 250 x 500m cells. 175 cells evenly distributed across the study site were sampled in this way. Herbivore distribution was assessed following the methodology of Landsberg & Stol (1996). Herbivore activity was sampled twice before piping the bore, in December 1994 and March 1995 and then at 6 monthly intervals until October 1997. Patch quality for the herbivores at the study site was estimated by forage biomass and defoliation. Woody cover was also measured from each biomass quadrat.

## RESULTS

The heterogeneity in herbivore impact (dung/biomass) was much higher than the heterogeneity in herbivore dung distribution (T-test,  $P < 0.05$ ) (Table A). Herbivore and plant distribution were correlated with distance from waters and fencelines and with vegetation attributes (Table B).

## DISCUSSION

While herbivore and vegetation distribution were significantly correlated with several factors, these factors could not account for much of the variation in herbivore and plant patterns. There was a high degree of temporal variability in herbivore distribution patterns, not just related to changing water distribution. Even within a mulga paddock of predominantly one landsystem, the variation in

vegetation cover and species composition was marked. However, including vegetation parameters in regression models did not improve the models for sheep distribution. The native herbivores which presumably have evolved in this system were more likely to be correlated with food resources at the scale of this study. This is in contrast to sheep whose spatial selection of feeding sites was partly influenced by non alimentary factors such as distance to waters, winds and fences, but largely unexplained. This may indicate that sheep are unable to respond to changes they have made to their environment at scale of arid zone rangeland paddocks.

**Table A: Average coefficient of variation of herbivore dung and impact index in Bore Paddock, Glencoban Station, Cunnamulla, SW Qld (October 1995-October 1997).**

	Average coefficient of variation (October 1995-October 1997)	
	Dung	Impact Index (Dung/Biomass)
Cattle	163	210
Kangaroos	65	163
Sheep	64	136

**Table B: Summary of significant predictor variables correlated with herbivore dung, impact index and biomass across Bore Paddock, Glencoban Station, Cunnamulla, SW Qld (Oct. 1995-Oct. 1997).**

	Predictor variables	Cattle dung	Cattle Impact	Kangaroo dung	Kangaroo Impact	Sheep dung	Sheep Impact	Herbaceous Biomass
Water	Distance nearest semi-perm. water	+	-			-	-	+
	Distance to boredrain	+/-						
	Distance nearest trough		+			+		
Fencelines	Distance nearest fence	-	-	+/-		-	-	+
Vegetation	% Cleared	+	+	+				
	Woody Cover	+	+	+	+	-		-
	Herbaceous Biomass	+		+				
	% Transition zone						+	-
Zone	% Runon zone			+				
	% Runoff zone		-					

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