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High resolution satellite imagery and GPS collars can help assist in the assessment of patch selection by grazing cattle in semi-arid savannas

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Key words : Patch type, Wambiana grazing trial, *Bothriochloa*

Introduction The selection of different patch types for grazing by cattle in tropical savannas is well documented. Advances in high resolution satellite imagery and computing power now allow us to identify patch types over an entire paddock, combined with GPS collars as a non intrusive method of capturing positional data, an accurate and comprehensive picture of landscape use by cattle can be quantified.

Material and methods The study was conducted over the Wambiana grazing Trial (20.54S, 146.14E, average rainfall 650mm, open savanna) (O'Reagain, Bushell et al. 2007). Patch types were identified using a previous study (Table 1).

Table 1 Description of the different patches and the proportion of patches within each treatment.

Patch Name	HSR%	LSR%	Description
2P	2.69%	2.55%	Perennial palatable grass species, Enteropogon sp, Sporobolus sp
<i>Bothriochloa</i> sp	14.61%	29.44%	Perennial palatable productive (3P) grass
Annuals	9.66%	10.05%	Annual grasses, mid to low palatability
<i>Aristida</i> sp	11.27%	8.34%	Tough unpalatable perennial wiregrass
Bare	5.42%	2.20%	Bare through all seasons, very small amount of annuals in wet season
<i>Chrysopogon</i> sp	10.80%	9.38%	Perennial palatable low bulk produced
<i>Carissa</i> sp	20.24%	15.70%	Thorny encroaching shrub
<i>Eriachne</i> sp	9.09%	7.29%	Tough unpalatable perennial long lived wiregrass
<i>Eriachne</i> sp/ <i>Heteropogon</i> sp	2.11%	0.93%	Eriachne patch with a moderate proportion of H. contortus (perennial palatable productive)
MT Annuals	4.72%	4.01%	Annuals on top of stony/salty clay mounds
MT <i>Bothriochloa</i> sp	2.05%	2.13%	Low density of <i>Bothriochloa</i> & annuals on top of clay mounds
MT <i>Carissa</i> sp	2.31%	2.54%	<i>Carissa</i> on top of stony/salty clay mounds

High resolution satellite images were acquired for Dec 2005 and Feb 2006 and combined. A supervised classification for approximately 300 predefined training regions over the study site was run using ER mapper[®] (2007). Archival GPS collars were fitted to 6 cattle in each of the heavy (HSR) and light (LSR) stocked treatments for approximately 12 weeks during Jan and March 2005. GPS positional data was collected every hour from a minimum of 4 satellites. The GPS data from the two animals with the most number of fixes per treatment was used in the analysis. Animal activity was classified into a grazing or resting phase. Only the grazing phase was analysed using Jacob's index of selectivity to determine avoidance or selection of patch types.

Results and discussion Animals in the HSR positively selected for patches dominated by *Bothriochloa* sp and annual grass patches, and avoided *Eriachne* sp and bare patches in the wet season of 2005 (Figure 1). The light stocking treatment animals selected for annual and *Eriachne* sp patches and avoided mound top Annuals and *Eriachne* sp/*Heteropogon* sp patches. The heavy stocked animals selected the annual patches because of the high availability of green feed and high digestibility. *Bothriochloa* patches produce the bulk of the forage available in these land types. The high number of animals in the HSR and smaller proportion of *Bothriochloa* patches available means that animals had to actively select them to ensure a sufficient grass intake. The LSR animals selected annual patches to maximize their green feed intake. The LSR are selecting the *Eriachne* sp patches to graze a number of abundant forb species which only occur in the early and mid the wet season, these forbs have a relatively high proportion of protein (unpublished data). The LSR are able to selectively graze these forbs despite their low bulk, due to the higher proportion of *Bothriochloa*sp patches available throughout the paddocks, which will meet its nutritional requirement for bulk.

Conclusions The heavy and light stocking treatments selected different patch types to actively graze. Animals in the LSR are able to select a diet based on quality, where animals in the HSR are constrained by the available bulk within a patch. The high resolution satellite imagery combined with GPS collars gave us new insights into how these cattle are using this landscape.

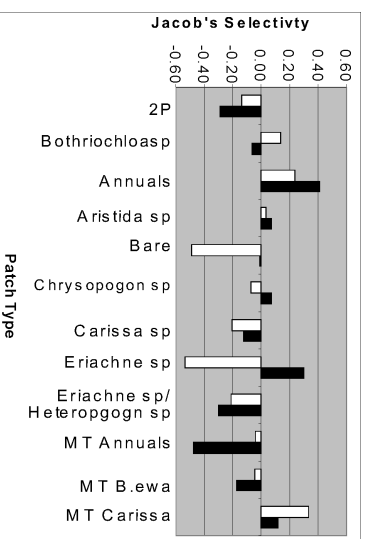


Figure 1 Jacob's selectivity index for different patch types under heavy (□) and light (■) stocking treatments.