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# Utilizing our Rangeland more Effectively: What can We Learn from Wild Herbivores?

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**T**he increasingly challenging economic climate that livestock and wildlife managers are confronted with necessitates novel approaches to rangeland management. Increasing production while maintaining lower input costs to ensure viable economic and ecological margins is becoming more imperative, but how achievable is this?

We propose that the foraging strategies applied by wild herbivores to utilize the available forage may give us some pointers to such novel approaches. From extensive work on factors that determine herbivore densities and distribution we know that rainfall and soil nutrients and moisture are critical drivers of rangeland ecosystems driving differences in forage biomass, forage nutrient content and species composition (Coe et al. 1976; East 1984; Fritz & Duncan 1994). Thus one would expect the highest density of herbivores in areas with high rainfall and high soil nutrients. Nutrient rich soils have more organic material often with a higher clay content, yielding a grass sward and tree layer with many palatable plant species.

The lowest herbivore densities would thus be expected in low rainfall areas on nutrient poor sandy soils.

Why does the Kruger National Park not exhibit the expected herbivore biomass pattern? Research showed that the grazers concentrate on nutritious patches such as sodic sites and termite mounds in the granites (Grant & Scholes 2006) (Figure 2). The same pattern has been described in other studies especially in East Africa where grazing lawns were found to be favoured by grazers (McNaughton 1984); (Augustine et al. 2003). Old kraal sites have also been shown to be attractive to grazers with significantly higher forage nutrients even 40 years after being abandoned (Scholes & Walker 1993; Van der Waal et al. 2011). For many years managers have been primarily concerned about plant production. This concern led to the development of grazing systems aimed at increasing plant production by ensuring that key plant species of high forage quality could produce sufficient biomass to enhance livestock production in the long term.

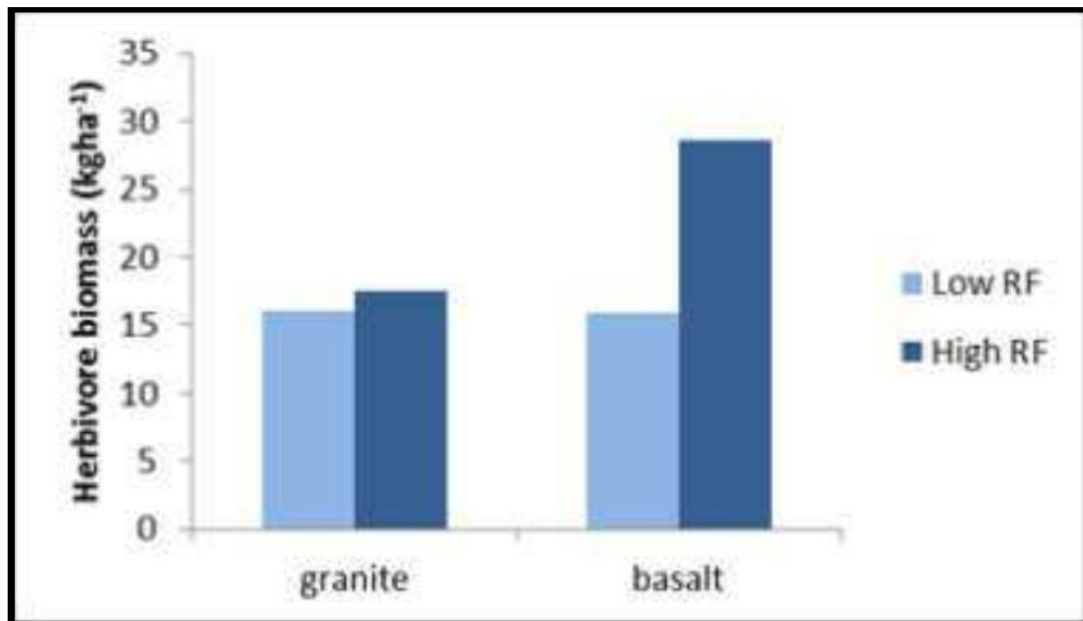


Figure 1. Mean herbivore densities in low and high rainfall zones in the Kruger National Park on low nutrient granites vs. high nutrient basalts.



Figure 2. Selection of short grass forage patch in a granitic landscape.

These systems aimed to ensure uniform animal distribution at a relatively high stocking density, thus avoiding the spatially heterogeneous patch grazing described above. The intention of rotational grazing systems is to improve species composition and production by ensuring a rest period during the growing season (Briske et al. 2008).

Results of research investigating the outcome of these different grazing systems vary, making the selection of appropriate systems difficult. Continuous grazing systems generally perform better than rotational grazing systems. (Briske et al. (2008) compared the production obtained in experiments following different grazing systems to production from continuous grazing. They reported that plant production was equal or greater in continuous compared to rotational grazing in 87% (20 of 23) of these experiments. Animal production per head and per area was equal in 92% (35 of 38) or greater in 84% (27 of 32) in continuous compared to rotational grazing experiments. The fact that production was generally higher in continuous grazing systems, poses the question whether these animals perform better because they can select and maintain nutritious forage patches as illustrated by the patchy utilization of rangeland by wildlife. Both domestic and wild herbivores require protein and phosphorous rich forage to reproduce and to gain weight (Meissner et al. 1981; Prins & Beekman 1987).

These nutrient-rich patches often supply islands of the required high quality forage in a sea of low quality. This raises the question whether the current use of rotational grazing systems should not be re-evaluated to enable animals to utilize and maintain nutritious patches thus enhancing effective animal production in Africa.

### **Nutritious foraging patches and Herbivore Production**

There are a number of types of nutritious foraging patches. The easiest way to identify these are that they are areas of short grass, often within areas of much taller and less utilized grass. Grazing lawns are a striking example of such foraging patches.

A simple definition of grazing lawns is that they are areas where grasses are kept in a short, productive, palatable and digestible state by the action of grazers (after Coetsee et al. 2011). The stoloniferous grasses that are dominant in these lawns, are very short grasses that maintain high cover and production despite severe grazing pressure (Stock et al. 2009). In fact the stoloniferous species occurring on these lawns are able to out-compete the other species under high grazing levels. These lawns tend to form more easily on nutrient enriched sites such as around termitaria, large trees and in lower lying areas where the clay content is higher.

The actively growing grasses are attractive to animals and their continuous presence on these lawns probably increases nutrient concentrations through their dung and urine thus maintaining and enriching these areas (McNaughton 1979; van der Waal et al. 2011). In this system resting causes the replacement of these palatable and productive grasses with less palatable tuft grasses (Archibald 2008) so that the stoloniferous grasses lose the competition with the other grass species, lowering the capacity of the forage and especially lowering the forage quality to support animal production. Although nutritious hotspots can be created naturally by termitaria and large trees (Holdo & McDowell 2004; Treydte et al. 2008), they can also be created by mowing (Archibald et al. 2005) and fertilization (Cromsigt & Olff 2008).

Mowing does not have to be mechanical but bunched cattle and rhinos can also mow lawns to a sufficient height and thereby facilitate other herbivores to utilize these areas too. We still need to establish the ideal ratio between such nutritious patches in the grasslands. First approximations are that these short grass areas should probably not cover more than 30 % of the available forage. We propose that a change in our approach to animal production from rangeland should be considered. Although many of the climax grass species benefit from low utilization and long periods of rest,

grazing tolerant grasses can only be maintained at a highly productive and nutritious state by regular defoliation.

Allowing animals to utilize these heterogeneous areas with nutritious patches continuously will reduce management inputs such as supplementation while fencing can be reduced with no production losses. These ideas will be tested further in a range of wildlife areas and on cattle ranches to improve our understanding of the interaction between grazers and the plants that are fed with them. We hope this research will supply a viable alternative to conventional grazing practises.

### **Acknowledgements**

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