

# Effect of enclosure and open grazing on diet selection, relative preference index and voluntary intake by sheep at El-Khuwei Locality North Kordofan State Sudan

Mohammed Abdelkreim and Babo Fadlalla

Sudan University of Science and Technology, Street 61, Khartoum, Sudan, [www.sustech.edu](http://www.sustech.edu)  
Contact email: [abdelkreim@yahoo.com](mailto:abdelkreim@yahoo.com)

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## Introduction

The nutritive value of a pasture depends mainly on its intake and the selection animals exert in consuming the different species or the various parts of a determined plant (Mayes and Dove 2000). Animal production in North Kordofan State is mainly traditional depending on natural rangeland (Cook and Fadlalla 1987; DHP 1998). The State is rich in animal and range resources. It contains more than 13 million head of sheep, goats, camels and cattle (IFAD 2011).

The study aims to provide information that contributes to a better understanding of the plant-animal inter-actions through knowledge of diet botanical composition, forage biomass production and voluntary intake.

## Methods

The study area lies between longitudes 28°31' - 28°30'N and latitudes 12°14' - 14°12'E. It has an average monthly temperature of 34.6°C (Africover 2004). The study was conducted in 2010. Two sites were selected, an enclosure and an open range at flowering and at seed set stages. Bite-count was used to estimate diet botanical composition (Papachristou 1991; Risenhoover 1989; Fadlalla 1985). Relative preference index (RPI) was calculated from % species in the diet and botanical composition of range % (NRPH 2003). The range plants were classified according to their (RPI) into five forage value categories (NRC, 2003). Sheep dry matter intake (DMI) was assessed using a relationship between total faeces excreted and *in vitro* dry matter digestibility (Tilley and Terry 1963).

## Results

At flowering, plants with the highest (RPI) in the enclosure were *Zornia* spp. (RPI=12.9), *Merremia* spp. (RPI=12.6) and *Desmodium* spp. (RPI=2.0). In the open range plants with the highest (RPI) were *Desmodium* spp. (RPI=15.9), *Ipomea eriocapa* (RPI=15.7) and *Echinochloa colonum* (RPI=5.1). At seed set stage, in the enclosure, plants with highest RPI were *Ceratothera* spp. (RPI=22.4), *Zornia* spp. (RPI=2.1) and *Desmodium* spp. (RPI=1.7) At the open range the plants with highest RPI were *Desmodium* spp. (RPI=10.4), *Zornia* spp. (RPI=6.5) and *Ipomea eriocapa* (RPI=2.5). Generally sheep selected more forbs than grasses. *In vitro* dry matter digestibility was higher at flowering than at seed set stage ( $P<0.001$ ) (Table 1). Crude protein (CP%) of biomass vegetation at flowering, in

**Table 1. *In vitro* dry matter digestibility (IVDM) of the diets of grazing sheep.**

Site	Flowering stage	Seed set stage
Open	61.75	58.33
Enclosure	62.38	59.84

**Table 2. Mean dry matter intake (DMI) by grazing sheep.**

Site	Parameters	Flowering	Seed set
Enclosure	Mean DMI (g/day)	983	972
	DMI % body weight	3.09	2.90
	DMI g/kg w <sup>0.75</sup>	69.97	73.97
Open	Mean DMI (g/day)	643	560
	DMI % body weight	1.96	1.80
	DMI g/kg w <sup>0.75</sup>	46.94	42.69

enclosure, was 10.9%; that of the diet consumed was 15.3%. In the open range CP% of biomass vegetation was 10.0%; that of the diet was 11.9%.

Sheep DMI was higher at flowering than at seed set ( $P<0.001$ ) probably due to changes in animal behaviour in response to change in plant chemical composition on maturity (Table 2).

## Conclusion

Sheep selected more forbs than grasses. Further understanding of the animal: plant interface and its influence on selection and nutritive value is required. Sheep selected a diet superior than the average quality of the biomass vegetation. *Cenchrus biflorus* should be harvested during flowering stage and stored as hay in order to be used during periods of scarcity (summer). These findings may be considered as a basis for a management system in the El-Khuwei Locality which will be invaluable in developing sustainable management strategies.

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