

Dry matter intake, digestibility and diet selection by sheep grazing on reseeded and naturally regenerating range sites at Sheikan Locality, North Kordofan State, Sudan

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Introduction

The aim of this study was to evaluate range quality for sheep from reseeded and naturally regenerating (un-reseeded) range sites at Sheikan Locality, North Kordofan State, Sudan. The study area suffers from over-grazing, excessive tree cutting and frequent cyclic droughts, which have led to a domination of short-lived un-preferred annual plants.

Materials and Methods

This study was conducted at Sheikan Locality, North Kordofan State, Sudan during 2009/10 and 2010/11. Two range sites were selected, one was reseeded with indigenous forbs species and the other was natural (control). The range was evaluated at flowering and at seed set stages of growth using 10 rams, five at each site. The parameters investigated were: (1) botanical composition of the range estimated according to Abusuwar and Ahmed (2010) and Parker (1961), (2) diet composition measured using the bite-count technique (Abusuwar and Ahmed 2010; Van Dyne 1968), (3) crude protein (CP %) and crude fibre (CF %) of plant samples assessed according to AOAC (1980), (4) dry matter digestibility using acid insoluble ash technique (AIA) (William *et al.* 1970) and (5) dry matter intake (DMI) assessed by the equation of Maynard and Lossli (1969). Relative preference index (RPI) was calculated from the percentage of plant species in diet and in range. Range plants were classified according to RPI into forage value categories of preferred, desirable and undesirable plants (NRC 2003).

Results and discussion

At flowering, plants with highest RPI on the reseeded range site were *Ipomoea blepharosepala* (RPI=2.24), *Crotalaria*

spp. (RPI=2.17), *Indigofera* spp. (RPI=1.83), *Dactyloctenium aegyptium* (RPI= 1.72), *Tephrosia* spp. (RPI= 1.60) and *Polygala eriotea* (RPI= 1.49). On the un-reseeded range, plants with highest (RPI) were *Indigofera* spp. (RPI=4.43), *Ipomea concinperma* (RPI=2.43), *Ipomoea blepharosepala* (RPI=2.41), *Tribulus terrestris* (RPI=1.96), *Eragrostis tremula* (RPI= 1.79) and *Tephrosia* spp. (RPI= 1.76).

At seed set stage, on the reseeded range site, plants with highest (RPI) were *Tephrosia* spp. (RPI=12.07), *Colocynthis citrullus* (RPI=8.63), *Indigofera* spp. (RPI=8.04), *Ipomoea* spp. (RPI=4.93), *Crotalaria* spp. (RPI=2.81), *Corchorus olitorius* (RPI=1.85), *Sesbania sesban* (RPI=1.43) and *Polygala eriotea* (RPI= 1.36). On un-reseeded site plants with highest RPI were *Sesbania sesban* (RPI=3.35), *Ocimum basilicum* (RPI=2.65), *Seddera* spp. (RPI=2.46), *Justicia kotschy* (RPI=2.39) and *Tephrosia* spp. (RPI=2.21).

Overall, the sheep selected far more forbs than grasses, generally at a higher rate than found in the composition, at both range sites and for both stages of growth (Table 1).

Chemical composition (Table 2) shows that CP % was higher in the diet selected by sheep compared with herbage biomass. It was also higher in reseeded than in un-reseeded site. Crude fibre was lower in the diet compared with herbage biomass. It was also lower in reseeded than in un-reseeded range site. Sheep selected a diet superior than that of herbage biomass. Moreover, reseeded improved range quality. Crude protein decreased and CF increased with maturity indicating an increase in cell wall constituents as plants mature.

Acid insoluble (AIA) digestibility at flowering was higher in the diet selected from the reseeded site (67.3 %) than that from un-reseeded site (64.7 %). At seed set stage

Table 1. Percent grasses and forbs in range and in diet at the two sites

Grasses & forbs	Reseeded range site				Un-reseeded range site			
	Flowering stage		Seed set stage		Flowering stage		Seed set stage	
	Grasses	Forbs	Grasses	Forbs	Grasses	Forbs	Grasses	Forbs
% in range	14.61	85.39	28.06	71.94	21.20	78.72	29.65	70.35
% in diet	11.85	88.15	7.45	92.55	14.98	85.02	6.78	93.22

Table 2. Chemical composition of diet selected by grazing sheep and of herbage biomass

Parameter	Parameters	Reseeded site		Un-reseeded site	
		Flowering	Seed set	Flowering	Seed set
Diet selected	CP %	15.0	11.4	14.0	11.7
	CF %	24.5	26.1	33.5	37.3
	AIAD %	67.3	64.2	64.7	59.9
Herbage biomass	CP %	11.9	11.5	10.3	9.2
	CF %	31.5	33.2	38.0	39.7

it was also higher for the reseeded site (64.2 %) compared with un-reseeded site (59.9 %) ($P < 0.001$).

On the reseeded site DMI was 52.8 g/kg $w^{0.75}$ at flowering and 37.5 g/kg $w^{0.75}$ at seed set. On the un-reseeded site it was 41.0 and 29.1 g/kg $w^{0.75}$ at flowering and seed set respectively ($P < 0.001$). As percent of live body weight DMI was 2.5 % and 1.9 % on the reseeded and un-reseeded sites respectively at flowering stage; while it was 2.0 % and 1.7% on the reseeded and un-reseeded sites respectively at seed set stage. Fadlalla (1987) reported DMI values of 92.1 g/kg $w^{0.75}$ and 3.9% of live body weight for lactating transhumant sheep in South Kordofan, Sudan. The higher values may be attributed to the higher energy requirements of lactating sheep and to added requirements for walking some 20 km/day. South Kordofan range is also richer as rainfall is higher. Van Dyne and Meyer (1964) reported values of 43.5-58.0 g/kg $w^{0.75}$ for sheep grazing annual summer range in California.

Conclusion

The diet of sheep was of superior quality to the average quality of the herbage biomass as sheep select plants of higher quality, particularly forbs, and more nutritious plant parts. Reseeding with forbs marginally enhanced the protein quality of the diet. Grazing at flowering may be a good strategy to harvest forage when CP % is high and CF % is low. Preferred plants may be considered as key species for reseeded of degraded rangeland.

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