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Food selection in the blesbok on pasture with low plant diversity

W. Kilian and N. Fairall

Mammal Research Institute, University of Pretoria, Pretoria 0002, Republic of South Africa

Factors influencing food plant selection by the blesbok *(Damaliscus dorcas)* were studied in an area with simple plant composition. *Dicanthium pyllosum* leaves were specifically selected by the blesbok. Cuticle analysis gave a ratio of 1 *Dicanthium* to 1,85 of all other species. A strong negative correlation was found between ADL and digestibility which explains the low digestibility of *Aristida* and *Dicanthium* stalks. Although *Cynodon* had a higher CP content than *Dicanthium* its apparent rejection was probably related to a high lignin content and hence low digestibility. The animals appear to select indirectly for the most highly digestible species.

Faktore wat die plantvoedsel keuse van die blesbok *(Damaliscus dorcas)* beïnvloed, is ondersoek in 'n gebied met 'n eenvoudige plantsamestelling. *Dicanthium pyllosum* blare is spesifiek uitgesoek deur die blesbok. Kutikulum analise het 'n verhouding van 1 *Dicanthium* tot 1,85 van alle ander spesies aangetoon. 'n Sterk negatiewe korrelasie is gevind tussen ADL en verteerbaarheid wat die lae verteerbaarheid van *Aristida* en *Dicanthium* stingels verklaar. Hoewel *Cynodon* 'n hoër CP inhoud as *Dicanthium* gehad het is dit skynbaar verwerp op grond van die hoë lignien inhoud en gevolglik lae verteerbaarheid. Dit lyk asof die diere indirek selekteer vir die mees verteerbare spesies.

Keywords: Food selection, blesbok, fibre, protein, digestibility

Introduction

A large herd of blesbok *Damaliscus dorcas* on the Derdepoort radio site of the Post Office near Pretoria provided an ideal opportunity to study factors influencing food plant selection as the area grazed during the study had a relatively uncomplicated plant composition. The grass cover used for grazing was dominated by *Dicanthium pyllosum* and *Aristida congesta* with *Cynodon dactylon* occurring as isolated plants throughout the area but not in its usual 'lawn' form. A *Bracharia* sp. was also found irregularly. While animals spent the greater part of the day feeding on this plant community they also entered the *Hyparrhenia* dominated tall grass veld and most likely grazed here to a limited extent as well.

Methods

Prior to beginning the study the preferred grazing area of the blesbok was determined by regular observation over a two-week period. Six exclusion plots of four square metres were randomly placed in this grazing area during March 1981. At the end of May, after the growing season, the following procedure was adopted:

(i) The heights of all plants in the exclusion plots were measured to quantify the ungrazed situation.

(ii) Four lines of nine metres were laid our perpendicular to each side of all plots and the heights of all plants at 25 cm points on these lines were measured to determine which plants were grazed.

Five fresh dung samples were collected during the study period and investigated by the plant cuticle method to verify the results obtained in the exclusion plots. Samples were prepared using the procedure described by Monro (1979). Not all cuticle remains were identified, however, and only the ratio of *Dicanthium pyllosum* leaf cuticles to all other identifiable remains was calculated.

During the experimental period a 500 g sample of each

of the major grasses was collected for chemical analysis. Nitrogen determination was by the Kjeldahl method and crude protein was estimated by multiplying the nitrogen value by 6,25. Fibre components were analysed using the method of Goering and Soest (1970). Three replicates were used in each determination, the following fractions being determined:

(a) Cell wall content (NDF) approximating total fibre.
(b) Acid soluble content (ADF) approximating ligno-cellulose.
(c) Lignin content (ADL) approximating lignin and cutin.
(d) Hemicellulose calculated as the difference between NDF and ADF.
(e) Cellulose calculated as the difference between NDF and ADL.

The method of Tilley and Terry (1963) was used to determine the *in vitro* dry matter digestibility of the plant samples. Rumen fluid from grass fed sheep was used to inoculate the medium. The results of this determination do not reflect the digestibility of the grasses by blesbok but are used to show the relative digestibility of grasses investigated.

Students unpaired *t*-test was used to test differences between plant heights and significance was set at the five percent level.

Results and Discussion

Field survey

The mean heights of each grass species in each exclusion plot are shown in Table 1. Significant differences between the leaf height of *Dicanthium* inside and outside the plots were evident in all cases except plot four where the *Dicanthium* was growing in an area dominated by *Aristida* which presumably led to the whole area being ignored by the blesbok. No significant difference was found in the heights of the other species or the *Dicanthium* stalks. These results were interpreted to mean that *Dicanthium pyllosum* leaves were specifically selected by the blesbok.

Cuticle identification

Although this method has been criticized when used for quantitative study of herbivore diets, it remains valuable for qualitative evaluation of diet and in this case a total of 200 identifiable fragments in four dung samples had 70 *Dicanthium* cuticles giving a ratio of 1 *Dicanthium* to 1,85 of all other species.

The epidermal patterns of stems and stem sheaths differ from those of leaves. This was not taken into account in this study, and it can therefore be expected that the importance of this species was underestimated.

Table 1 Mean heights with standard deviations (cm) of plants measured inside and outside exclusion plots

Plot no.		Grass species			
		C. dactylon	*D. pyllosum* leaves	*D. pyllosum* stems	*A. congesta*
(i)	Inside	14,86 ± 1,84	8,45 ± 1,67[a]	26,67 ± 11,21	21,50 ± 7,99
	Outside	20,34 ± 4,99	5,43 ± 1,09[a]	24,36 ± 16,51	20,94 ± 6,21
(ii)	Inside	13,02 ± 4,62	8,12 ± 1,53[a]	22,30 ± 6,79	17,57 ± 3,47
	Outside	16,42 ± 4,26	5,07 ± 1,21[a]	16,43 ± 7,32	17,30 ± 5,16
(iii)	Inside	13,44 ± 4,47	10,65 ± 3,04[a]	33,82 ± 11,58	30,79 ± 10,28
	Outside	20,45 ± 3,69	4,49 ± 0,67[a]	41,49 ± 9,32	27,80 ± 5,45
(iv)	Inside	15,90 ± 5,53	7,74 ± 1,45[a]	27,33 ± 9,27	17,90 ± 3,01
	Outside	15,26 ± 1,79	7,68 ± 1,71[a]	30,41 ± 11,32	17,66 ± 2,21
(v)	Inside	16,91 ± 5,54	9,42 ± 2,01[a]	30,32 ± 8,41	24,26 ± 6,81
	Outside	16,21 ± 4,97	5,32 ± 1,82[a]	29,76 ± 7,82	23,94 ± 6,32
(vi)	Inside	21,65 ± 5,51	12,24 ± 0,62[a]	43,66 ± 6,71	31,50 ± 6,49
	Outside	21,59 ± 4,89	4,89 ± 1,11[a]	42,32 ± 9,71	26,80 ± 5,41

[a]indicates significant difference

Table 2 Mean values of fibre fractions, protein and digestibility of plant species in the area grazed by blesbok

Grass species	Chemical Composition (%)						(%)
	NDF	ADF	ADL	Hemi-cellulose	Cellulose	Protein	Digest-ibility
Cynodon dactylon	58,2	40,1	10,5	18,1	29,6	6,83	46
Dicanthium pyllosum leaves	60,1	42,2	9,6	17,9	32,6	4,81	65
Dicanthium pyllosum stems	73,4	51,6	10,9	21,8	40,7	1,57	59
Aristida congesta	72,6	50,0	12,0	22,6	38,0	3,85	36

Chemical analyses

The mean values for the different fibre components and the digestibility determinations are present in Table 2. *Aristida congesta* and *Dicanthium* stalks have similar high values for all the fibre components and a low crude protein content. Van Soest and Robertson (1977) have indicated that lignin and cutin are to a large extent resistant to the digestive process. A strong negative correlation between ADL and digestibility (Figure 1) was also found in this study and would explain the low digestibility of *Aristida* and *Dicanthium* stalks.

The highest crude protein and lowest NDF values were found in *Cynodon*. Protein content has been implicated in palatibility of vegetation selected by game (Monro 1979), and as the *Cynodon* was green and succulent at the end of the experiment its apparent rejection by the blesbok would seem to be coupled with the relatively high lignin content and hence to low digestibility.

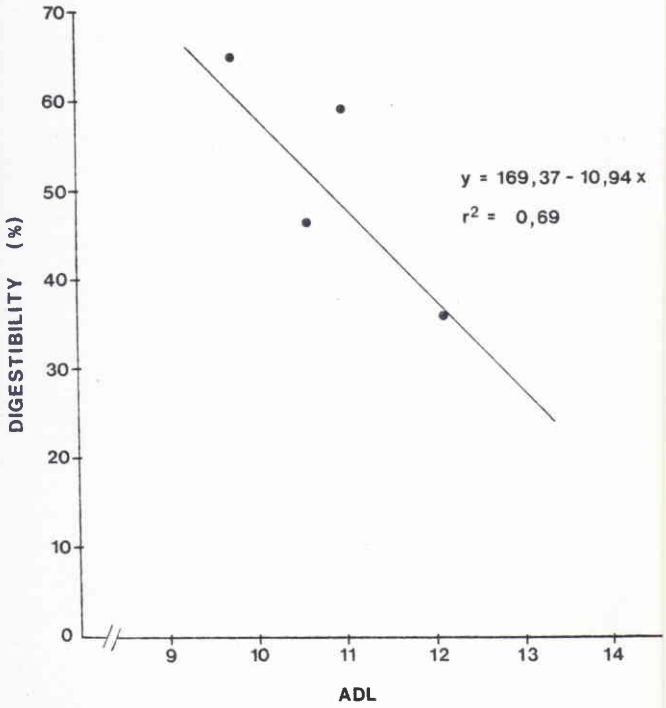

Figure 1 The relationship between % lignin (ADL) and digestibility of the different grasses in the study

The highly preferred *Dicanthium* leaves had the lowest ADL value and a high *in vitro* digestibility, the intermediate values for crude protein and NDF would seem to indicate selection of this grass on the basis of low total fibre content and hence a high apparent digestibility. The apparent ability of the blesbok to either select or reject food plants on the basis of lignin content, and the fact that this is related to digestibility in the plants investigated, leads to the speculative conclusion that the animals are indirectly selecting the most highly digestible species.

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