

The nutritive value of natural pasture in the Gordonia district

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Two veld types of the Gordonia district, namely Orange River broken veld and Kalahari sand veld, were evaluated in terms of chemical composition, feed intake and body mass change of grazing sheep. Adult wethers and non-reproducing ewes equipped with oesophageal fistulae were used in the study.

The nutritive value of both veld types with respect to crude protein and digestible organic matter (DOM) intake was sufficient for the maintenance requirements of non-reproducing sheep. Although low levels in crude protein and DOM-intake did occur in certain months, supplementation of protein or energy was not justified.

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Twee veldtipes van die Gordonia distrik, naamlik Oranjerivier gebroke veld en Kalahari-sandveld, is geëvalueer ten opsigte van die chemiese samestelling, voerinnome en liggaamsmassa verandering van nie-reproduserende weidende skape. Volwasse hamels en nie-reproduserende ooie toegerus met slukdermfistels is gebruik in die studie.

Die voedingswaarde van beide veldtipes ten opsigte van ruproteïen en verteerbare organiese materiaal (VOM) inname het aan die voedingsbehoefte vir onderhoud van droë skape voldoen. Hoewel lae peile in ruproteïen en VOM-inname voorgekom het gedurende sekere maande, was die omvang van hierdie peile nie van so 'n aard dat dit die byvoeding van proteïen of energie regverdig het nie.

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Introduction

The North Western Cape is the major Karakul pelt production area in the R.S.A. Farming is extensive in this region and to a large extent dependent on the natural pasture as a primary source of nutrition for these animals.

However, there is very little information available on the nutritive value of the native pasture in this region. Such information is essential if recommendations on the advisability and type of supplementary feeding are to be made. The present study was therefore undertaken as a starting point to evaluate the nutritive potential of the grazing on two of the more common veld types in this area with respect to non-reproducing ewes.

Procedure

The two veld types investigated were Kalahari sand veld and Orange River broken veld. Both veld types contain mainly grass and bush with an additional shrub component in the Orange River broken veld. The most common grass species in these veld types are *Stipagrostis uniplumis* and to a lesser extent *S. ciliata*, *S. obtusa* and *Eragrostis lehmanniana*. Bushes like *Rhigozum trichotomum* and species of *Lycium* and *Asparagus* are also present. The shrub component consists of species like *Monechma australe*, *Plinthus karooicus* and *Eriocephalus ericoides*.

The nutritive value of the two veld types was evaluated over a period of three years (July 1977 to June 1980). A four camp system rotated on a monthly basis, was used. A lick comprising equal parts of salt and di-calcium phosphate was always available to the animals.

The experimental animals on each veld type, except for those used to balance the grazing capacity (4,5 ha/SSU), consisted of eight wethers and three non-reproducing ewes equipped with oesophageal fistulae. These animals were used for the estimation of organic matter intake (OMI) and for the collection of grazing samples. Crude protein (CP) and organic matter (OM) content of the pastures were determined from samples, obtained by oesophageal fistula and cut by hand (quadrat sampling at random), to take into account the selective grazing behaviour of the sheep (Engels, 1972).

Digestibility of the OM of the grazing was determined from *in vitro* digestibility using an appropriate regression equation (Engels, Baard & Malan, 1974). The *in vitro* technique of Tilley and Terry (1963) was used with slight

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modifications suggested by Engels and van der Merwe (1967).

Organic matter intake (OMI) was determined indirectly by means of an equation given by Harris, Cook & Butcher (1959).

$$\text{OMI (g/day)} = \frac{100 \times \text{OM excreted (g/day)}}{100 - \% \text{ digestibility of OM}}$$

Results and Discussion

Precipitation

The experimental period was characterized by a low and unevenly distributed annual precipitation. The average annual precipitation of both veld types varies between 115 and 145 mm.

Body mass

The average monthly body mass of wethers during the experimental period is presented in Figure 1.

It is evident (Figure 1) that the animals maintained their body mass satisfactorily during all three years on both veld types. During 1979/80 the body mass of wethers was however, appreciably higher than during the preceding years.

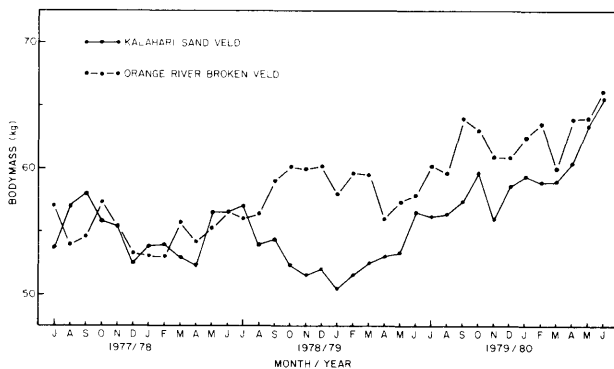


Figure 1 Mean monthly body mass of wethers during the experimental period

Nutritive value

Crude protein content and digestibility

The average CP content (expressed on an organic matter basis) and digestibility of samples of the native pasture, either selected by the sheep or cut by hand, for the 3-year experimental period are shown in Figures 2 & 3 for the Kalahari sand veld and Orange River broken veld, respectively.

From Figures 2 & 3 it is clear that CP content and digestibility of hand cut samples were generally lower than those of samples selected by sheep, thus emphasizing the selective grazing behaviour of sheep. Over the 3-year period CP content and digestibility of hand cut samples were respectively 53 and 20% lower than those of samples selected by sheep.

In the Kalahari sand veld the CP content and digestibility of samples selected by sheep varied over the 3-year period, between 5 – 20% and 50 – 67%, respectively, with corresponding averages of 8,00 and 60,67%. In the Orange River broken veld the CP content and digestibility of samples selected by sheep varied, over the same period, be-

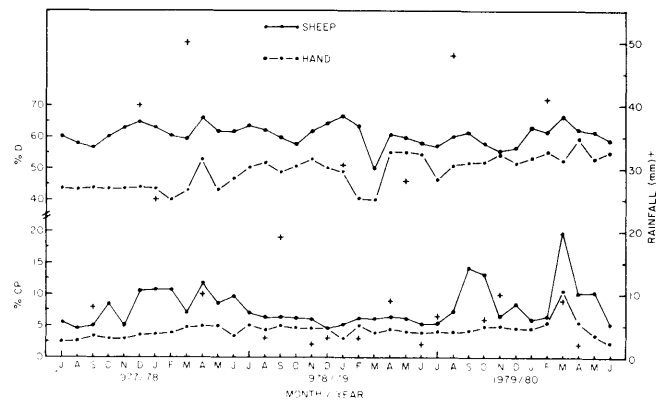


Figure 2 The average crude protein (CP) content and digestibility (D) of the native pasture (Kalahari sand veld) as selected by sheep and as collected by hand

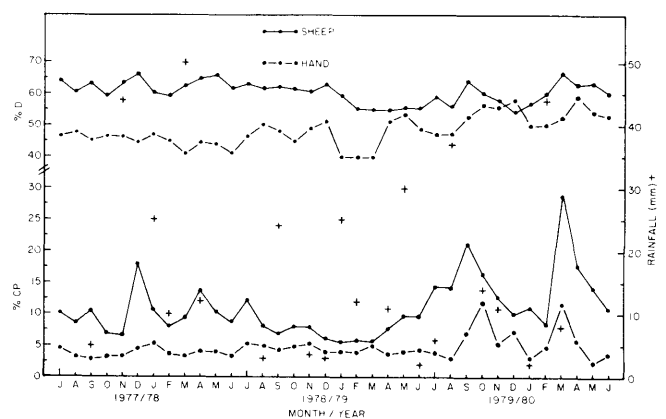


Figure 3 The average crude protein (CP) content and digestibility (D) of the native pasture (Orange River broken veld) as selected by sheep and as collected by hand

tween 6 – 28% and 55 – 67%, respectively, with corresponding averages of 11,22 and 60,91%. The tendency of these parameters was not consistent and showed no clear seasonal trend.

According to NRC figures (NRC, 1975), the daily maintenance requirements of a 50 kg sheep (non-reproducing, pen feeding) are 1 kg dry matter containing 8,9% CP and a digestibility of 55%. Comparing this with the above results, the average CP and digestibility of the Kalahari sand veld and Orange River broken veld are favourably matched.

Crude protein and digestible organic matter (DOM) intake

Figures for average daily CP and DOM intake (g/kg body mass/day) over the 3-year experimental period are presented in Figure 4.

In the Kalahari sand veld the CP and DOM intake varied, over the 3-year period, between 0,74 – 3,25 g and 8,12 – 16,53 g, respectively, with corresponding averages of 1,55 and 12,06 g/kg body mass/day. In the Orange River broken veld the CP and DOM-intake varied, over the same period, between 1,06 – 4,86 g and 9,20 – 21,25 g, respectively, with corresponding averages of 2,48 and 14,03 g/kg body mass/day.

A daily intake of 13,1 g DOM/kg body mass (Engels, 1972) and 1 g CP/kg body mass (NRC, 1975) may be accepted

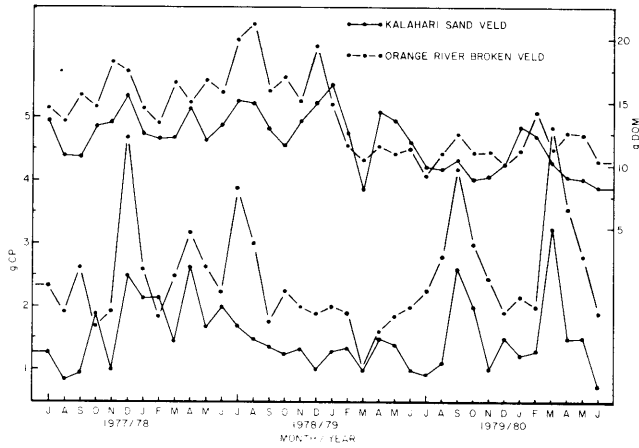


Figure 4 Crude protein (CP) and digestible organic matter (DOM) intake by sheep on native pasture (g/kg body mass/day)

as adequate for the maintenance of non-reproducing grazing sheep.

From the results presented in Figure 4 it is evident that the CP intake of sheep on the Orange River broken veld was sufficient to meet maintenance requirements. This was also the case on the Kalahari sand veld except that protein intake below maintenance requirements was recorded during August and September 1977, July 1979 and June 1980. Deficiencies in CP intake may thus occur during certain months but are of such a nature that supplementation is unnecessary.

DOM intake was frequently below maintenance requirements on both veld types. However, no clear trend over seasons is discernable. The Orange River broken veld was better in this regard than the Kalahari sand veld. However, these periods of deficiency in DOM intake had very little effect on the body mass of the sheep during the same periods (Figure 1), and it may thus be concluded that the deficiencies are of such a nature as to make supplementation of energy, as in the case of CP, unnecessary.

Predictability of nutritional value.

The nutritive value of natural pastures is difficult to determine and, therefore, more convenient methods for predicting nutritive value should be sought. Hence, the use of all possible regression equations was investigated. The regression equations are presented in Table 1.

From the results of both veld types in Table 1 it seems that the regression equation for the prediction of CP intake (g/kg body mass/day) from the % CP content of oesophageal fistula extrusa can be used. Because the magnitude of the numerical values of the dependent variables (Y) differ among the regression equations, coefficients of variation were determined in all cases to serve only as an indicator for judging the accuracy of prediction among them.

Although the above mentioned regression equation has the highest correlation coefficient and the lowest standard deviation, its accuracy of prediction, as indicated by the coefficient of variation, is no better than the other regression equations (Table 1). It cannot therefore be used to predict CP intake.

Because DOM intake is an important nutritional parameter in animal nutrition, the contribution of CP or digestibility to this parameter was investigated. A stepwise regression analysis shows that % CP as well as % digestibility must be included in a multiple regression equation for the prediction of digestible organic matter intake. It also shows that the contribution of the digestibility of the ingested food, of both veld types, to the DOM intake was superior to that of CP. The F values for crude protein content and digestibility of ingested food are 18,11 vs. 45,82 and 32,48 vs. 53,70, respectively, for the Kalahari sand veld and Orange River broken veld. The multiple regression equations for the Kalahari sand veld and Orange River broken veld are $Y = -17,505 - 0,316 X_1 + 0,529 X_2$ and $Y = -27,514 - 0,439 X_1 + 0,763 X_2$ (n = 36) respectively, where X_1 and X_2 in the regression equation are equal to the % CP and the digestibility of the ingested food, respectively.

Table 1 Regression equations describing the relationship between different nutritional factors used in the evaluation of the nutritive value of Kalahari sand veld and Orange River broken veld

Dependent variable (Y)	Independent variable (X)	Kalahari sand veld (n = 36)			Orange River broken veld (n = 36)		
		r	Regression equation	Sy.x (CV %)	r	Regression equation	Sy.x (CV %)
% CP OF — extrusa	% CP Hand sample	0,5587	$Y = 1,6313 + 1,4657 X$	± 2,9820 (37,26)	0,6139	$Y = 4,4464 + 1,4287 X$	± 4,0997 (36,54)
% D OF — extrusa	% D Hand sample	0,2378	$Y = 53,3885 + 0,1485 X$	± 3,5542 (5,48)	-0,0661	$Y = 62,7060 - 0,0370 X$	± 3,3229 (5,84)
g CP intake	% CP Hand sample	0,4495	$Y = 0,7059 + 0,1935 X$	± 0,5270 (34,07)	0,4773	$Y = 1,5293 + 0,2013 X$	± 0,7674 (30,90)
g DOM intake	% D Hand sample	-0,1124	$Y = 14,3407 - 0,0465 X$	± 2,2512 (18,66)	-0,2981	$Y = 21,3883 - 0,1518 X$	± 3,0893 (22,02)
% D OF — extrusa	% CP OF — extrusa	0,3628	$Y = 57,8981 + 0,3452 X$	± 3,1876 (5,25)	0,4347	$Y = 57,3058 + 0,3214 X$	± 3,2078 (5,27)
g CP intake	% CP OF — extrusa	0,9124	$Y = 0,3490 + 0,1497 X$	± 0,2415 (15,61)	0,8612	$Y = 0,7325 + 0,1561 X$	± 0,4439 (17,87)
g DOM intake	% D OF — extrusa	0,6174	$Y = -12,7430 + 0,4089 X$	± 1,7822 (14,78)	0,5519	$Y = -16,5129 + 0,5015 X$	± 2,6989 (19,23)

OF = Oesophageal fistulae, CP = Crude protein, CV = Coefficient of variation, D = Digestibility, DOM = Digestible organic matter, Intake = g/kg body mass/day

Conclusions

The nutritive value of both veld types with respect to CP and DOM intake is such that the maintenance requirements of non-reproducing sheep are largely met. The Orange River broken veld appears to be the better veld type in this regard. Although deficiencies in CP and DOM intake did occur in various months, the nature of these deficiencies did not justify the supplementation of protein or energy.

Acknowledgement

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