

# Spotlight on Agriculture

Ministry of Agriculture, Water and Rural Development • Directorate of Agricultural Research and Training • Private Bag 13184 • Windhoek

No 76 February 2004

## The influence of stocking rate on the utilization of individual grass species in the sward

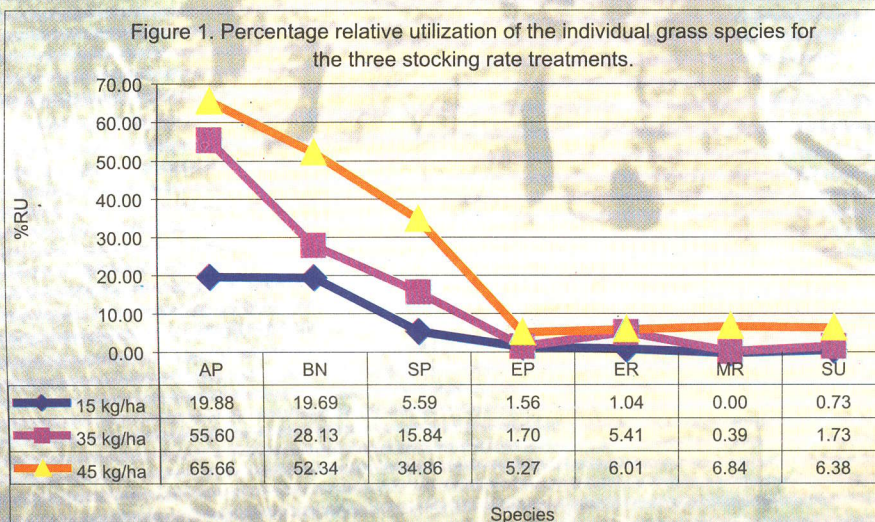
### INTRODUCTION

Food preference must be considered in relation to the kinds and amounts of the different foods which are on offer at a given time. Likewise, utilization, that is the ratio of the amounts eaten to the amounts on offer, can only be used to estimate diet if the values are weighed in proportion to the amounts on offer (Barns, 1975). Petrides (1975) distinguishes between principal foods and preferred foods. Principle foods of an animal population are those that are eaten in greatest quantities. These foods may not be those that are preferred. Preferred foods are those that are proportionally more frequent in the diet than in the available environment. Kruger and Edwards (1972) describe a technique to evaluate the utilization and relative palatability (acceptability) of different grass species to be compared. This implies that the degree of defoliation of an individual grass tuft of a specific specie is estimated and placed into a specific utilization class. The number of estimates of a specific grass specie in a specific utilization class is expressed as a percentage of the total number of estimates of all classes for that species. O'Reagain and Mentis (1985) group these utilization classes as preferred, avoided or intermediate acceptability. This paper attempts to evaluate the relative utilization of the different grass species in the sward at three different stocking rates. The three stocking rate treatments are 15, 35 and 45 kilograms live animal mass per hectare. The method to estimate the relative utilization of individual grass species suggested by Bester (1977) and Van der Westhuizen (1977), is used to estimate the relative utilization of the different grass species at Sandveld Research Station in the Camel Thorn Savanna.

### RESULTS AND DISCUSSION

The percentage relative utilization (%RU) of the different grass species at the end of the grazing period for the three stocking rate treatments is presented in Figure 1. The results are the averages of three periods during the year 1991, namely January to April, May to August and September to November. The percentage contribution (% frequency of occurrence) of the individual grass species to the total grass population is *Schmidtia pappophoroides* (33.65%), *Stipagrostis uniplumis* (15.46%), *Melinis repens* (14.23%), *Eragrostis rigidior* (6.87%), *Anthephora pubescens* (4.64%) *Eragrostis pallens* (2.18%) and *Brachiaria nigropedata* (0.34%).

Viewed in conjunction with Figure 1 it is clear that there is a marked difference in the relative utilization of the different grass species within a stocking rate treatment. The relative utilization of *A. pubescens* and *S. uniplumis* was in the order of 19.88% and 0.73%; 55.60% and 1.73%; and 65.66% and 6.38% for the 15, 35 and 45 kg/ha stocking rate treatments, respectively. Bester (1977) and Van der Westhuizen (1977) found that crude-protein content played a major role regarding the acceptability and degree of defoliation of the different grass species. Reed (1997) reported a crude-protein content of 16.95% and 8.75% for *S. pappophoroides* and *S. uniplumis*, respectively.



The results also indicate a marked increase in the degree of defoliation (%RU) as the stocking rate increases. *Anthephora pubescens* (AP), *B. nigropedata* (BN) and *S. pappophoroides* (SP) are regarded as "highly desirable" grass species that are acceptable to the grazing animal. The relative utilization of *A. pubescens* increased from 19.88% to 55.60% and 65.66% as the stocking rate increased from 15 to 35 and 45 kg/ha. The relative utilization of *Brachiaria nigropedata* and *S. pappophoroides* increased from 19.69% to 28.13% and 52.34%, and

5.59% to 15.85% and 34.86%, respectively. *Eragrostis pallens* (EP), *E. rigidior* (ER), *M. repens* (MR) and *S. uniplumis* (SU) are regarded as less desirable species. Although these less desirable species showed the same tendency as the highly desirable species, regarding the degree of defoliation for the three stocking rate treatments, the overall relative utilization was much lower (Figure 1). The acceptability of these species, compared to that of the highly desirable species, is much lower.

## CONCLUSIONS

- Taking into consideration the frequency of occurrence of *A. pubescens* (4.64%) and *B. nigropedata* (0.34%) and the volume of material removed (degree of defoliation) in the 45 kg/ha stocking rate treatment, these two grass species can be regarded as preferred species. The percentage relative utilization of these two species in the 45 kg/ha stocking rate treatment was in the order of 65.66% and 52.34%. The high contribution of *Schmidtia pappophoroides* (33.65%) to the total grass population and the relative high degree of defoliation (34.86%) in the 45 kg/ha stocking rate treatment renders this species as a principle food (Petrides, 1975) in this sward.
- *Schmidtia pappophoroides* can be classed as a species of intermediate acceptability. Heavy selection of preferred species occurs along with some light grazing of species of intermediate acceptability, while avoided species are almost completely ignored (O'Reagain & Mentis, 1989). The degree of defoliation of *S. pappophoroides* in the 45 kg/ha stocking rate treatment was 34.86%, while the defoliation of *E. pallens*, *E. rigidior*, *M. repens* and *S. uniplumis* was in the order of 5.25%, 6.01%, 6.84% and 6.38%, respectively. The latter four species can be regarded as avoided species. Avoided, meaning that these species initially were ignored by the grazing animal, while the preferred and intermediate species were being grazed.
- The results show very clearly that as the stocking rate increases, the degree of defoliation of the individual grass species increases. This implies that, should a heavier stocking rate than 45 kg/ha be applied, these grass species will have to be re-classed. *Schmidtia pappophoroides* will be categorized as preferred and *S. uniplumis* as intermediate acceptability. Increasing the stocking rate above 45 kg/ha, the frequency of occurrence of *A. pubescens* and *B. nigropedata* will diminish in the sward.
- A knowledge of the grazing and browsing animal combined with a knowledge of the vegetation available to them, is important in the management of vegetation and the development of efficient systems of animal production.
- The statement made by O'Reagain and Mentis (1989), that non-selective grazing systems may be based upon faulty grazing philosophy, in conjunction with these results, places the principles of controlled selective grazing in a better light and not far-fetched.



A wheel-point apparatus used to randomly select sample points (Tidmarch & Havenga, 1955).



*S. pappophoroides* which has been defoliated more than 75%.

- References: Barns D.L. 1975. A review of plant-based methods of estimating food consumption, percentage utilization, species preference and feeding patterns of grazing and browsing animals. Proc. Grassld. Soc. Sth. Afr. 11: 65 - 71.
- Bester F.V. 1977. A study of the production and utilization of *Themeda triandra* grass veld with cattle in the Central Orange Free State. MSc-thesis. University of the Orange Free State. Bloemfontein.
- O'Reagain P.J. & Mentis M.T. 1989. Sequence and process of species selection by cattle in relation to optimal foraging theory on an old land in the Natal sour sandveld. J. Grassl. Soc. South. Afr. 6(2): 71 - 82.
- Kruger J.A & Edwards P.J. 1972. Utilization and relative palatability of different grass species. Proc. Grassld. Soc. S. Afr. 7: 146 - 155.
- Petrides G.A. 1975. Principal foods versus preferred foods and their relation to stocking rate and range condition. Biol. Conserv. 7: 161 - 169.
- Reed E.R. 1997. The influence of stocking rates on the botanical composition and basal cover of the natural pastures. National Annual Agricultural Research Reporting Conference. MAWRD. Directorate Research and Training.
- Tidmarch, C.E.M. & Havenga C.M. 1955. The wheel point method of survey and measurement of semi-open grasslands and karroo vegetation in South Africa. Mem. Bot. Surv. No 29.
- Reed E.R. 1997. National Annual Agricultural Research Reporting Conference. MAWRD. Directorate Research and Training, Private Bag 13184, Windhoek, Namibia.
- Van Der Westhuizen F.G. 1977. A study of the production and utilization of grassveld with sheep in the Central Orange Free State. MSc-thesis. University of the Orange Free State. Bloemfontein.
- Authors: Reed E.R., Swanepoel J. & Bester F.V, MAWRD, Directorate Agriculture Research and Training, Private Bag 13184, Windhoek. Namibia.
- Editor: A. van Niekerk, MAWRD, Directorate Research and Training, Private Bag 13184, Windhoek, Namibia.