

ARTICLES

VELD MANAGEMENT FOR THE EASTERN TRANSVAAL HIGHVELD

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1 Introduction

Sourveld in South Africa constitutes a valuable resource by providing cheap grazing for sheep and cattle enterprises. Evidence indicates that in general grazing value of sourveld in South Africa is well below the potential. This represents a serious economic loss to the livestock industry.

The degradation of sourveld essentially takes the form of a decrease in preferred species and an increase in unpreferred or less preferred species.

The continuing degradation of sourveld has been a matter of great concern to research and extension personnel for several decades. In an effort to reverse the trend the major thrust has been on trying to persuade farmers to adopt grazing systems, and especially multipaddock grazing systems with relatively short periods of stay. These were presumed to be a means of minimising selective grazing and preventing loss of vigour and eventual disappearance of the preferred species.

The farmer acceptance of these multipaddock systems has, however, been minimal (Roberts 1969; Tainton 1985; Scholtz 1987). Recent critical evaluations of the empirical base for such recommendations have indicated that they were seriously flawed (O'Reagain & Turner 1992; Barnes 1992). Indications are that even if these recommendations are applied, veld condition may still deteriorate.

In response to the identification of problems facing the local farming community, several trials were carried out locally over the past 10 years to investigate the effects of veld management on veld grasses and animal performance. Results from these trials, combined with results from research carried out elsewhere in southern Africa, led to the development of a new management approach for local sourveld.

2 Effect of grazing management on veld vigour

One of the knowledge gaps that existed during the development of previous grazing systems was the direct effects of grazing on veld vigour, and particularly vigour of the preferred grasses.

Grass vigour can be defined as the potential or ability of a grass plant to re-grow during the season following defoliation. This measure has direct bearing on management, as it gives an indication of management effects on production of grazing during the following year, and it also serves as a short term measure of the effect of grazing on the "health" of the individual species.

In recent local trials, treatment effect on vigour has been determined by applying a range of defoliation treatments to veld in a particular season. During the season after treatment application, the regrowth (production) of all species or a selection of species was measured on both the previously defoliated veld as well as a previously ungrazed control (usually in the form of enclosure cages). The results of several of these trials are presented, as they give the background to the development of new grazing management recommendations.

2.1 Trial 1

In the first trial, designed to determine the effects of sheep grazing on veld vigour, the following treatments were applied

(Barnes 1987);

1. Veld was rested throughout the growing season (ungrazed control).
2. Veld was grazed lightly until mid-January, then rested.
3. Veld was grazed heavily until mid-January, then rested.
4. Veld was grazed lightly until mid-March, then rested.
5. Veld was grazed heavily until mid-March, then rested.
6. Veld was grazed lightly throughout the growing season.
7. Veld was grazed heavily throughout the growing season.

A rotational grazing procedure was simulated, with sheep grazing all treatments for a period of about one week, followed by a three week absence.

The effects of these grazing treatments on the grass vigour was determined by measuring the production during the following season of *Themeda triandra*, *Heteropogon contortus* and *Trachypogon spicatus* as well as the total production of the veld. The results are shown in Figure 1.

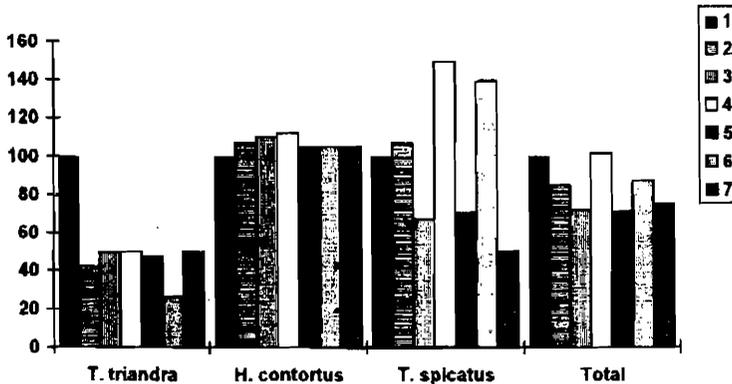


Figure 1 Shoot yields of three veld grass during the season after application of different grazing and resting schedules. Expressed as percentage of the ungrazed control. Treatments were as follows:

- 1 Veld was rested throughout the growing season (ungrazed control).
- 2 Veld was grazed lightly until mid-January, then rested.
- 3 Veld was grazed heavily until mid-January, then rested.
- 4 Veld was grazed lightly until mid-March, then rested.
- 5 Veld was grazed heavily until mid-March, then rested.
- 6 Veld was grazed lightly throughout the growing season.
- 7 Veld was grazed heavily throughout the growing season.

The grazing treatment negatively affected the production of *Themeda triandra* during the following season, while the other two species were not affected to the same degree. The effect on total veld vigour depended on the proportion of the sensitive species present. The unexpected drastic effects of grazing on the vigour of *Themeda triandra*, a locally common and important veld grass, led to further trials designed to quantify these effects under varying conditions.

2.2 Trial 2

A cutting trial with controlled frequencies and intensities of defoliation was carried out to obtain more clarity of the effects of defoliation (Moore 1989).

The following defoliation treatments were carried out on *Themeda triandra*:

1. Undeveloped control.
2. Cut three times at six weekly intervals at 40 mm above ground level.
3. Cut five times at six weekly intervals at 40 mm above ground level.
4. Cut three times at six weekly intervals at 20 mm above ground level.
5. Cut five times at six weekly intervals at 20 mm above ground level.

Treatments two and four, which were cut three times during the season, were left to grow undisturbed after the last cut at the beginning of January, while treatments 3 and 5 were cut twice more, totalling five cuts over the whole season. The results are shown in Figure 2.

All defoliation treatments negatively affected vigour relative to the undeveloped control during the following season. From these results it appears that increasing defoliation frequency has a greater depressive effect on vigour than increasing intensity.

2.3 Trial 3

A full scale grazing trial was then initiated. Included in the objectives was the measurement of the effects on veld vigour of sheep grazing when stocked at different intervals after a spring burn (Barnes & Denspey 1992). The first time of stocking was as soon after the spring burn as possible (treatment 1), the second time approximately three weeks later (treatment 2) and the third time was approximately three weeks after the second (treatment 3). The vigour indices for each of three palatability classes are shown in Figure 3 for each time of stocking relative to an ungrazed control. The trial was grazed rotationally using a four week cycle.

The production of the palatable grasses in all three treatments was reduced in the season following grazing to between 50 and 60 % of that of the palatable grasses in the ungrazed control. The production of the intermediate grasses in all treatments was approximately similar to that of the intermediate grasses in the control. The unpalatable grasses showed an increased production in all treatments relative to the unpalatable grasses of the control.

Vigour of the palatable grasses was depressed by grazing even when time of stocking was delayed in spring. Delaying the time of stocking in spring thus had a relatively small effect on fostering vigour. Sheep performance on the latest time of stocking treatment was approximately 50 % of the performance on the early time of stocking treatment.

3 Discussion

The development of methods suitable to easily measure the effect of grazing on vigour of veld grasses can be considered a breakthrough in the quest to understanding the interaction between grass and grazers.

From the results of the above trials, several important points are obvious:

- Grazing (or defoliation) negatively affects veld vigour. This effect is positively correlated to grazing pressure (intensity and frequency).
- Grazing has a greater negative effect on palatable grasses (which are subjected to a relatively high grazing pressure) than on unpalatable grasses (which are ungrazed or only lightly grazed). The vigour of unpalatable grasses appears to be stimulated by grazing, probably partly because of reduced competition from the palatable grasses.
- Delaying the time of stocking in spring has a small positive effect on veld vigour relative to stocking early. However, even stocking late in spring reduced vigour of the palatable grasses to less than 60 %, and reduced sheep performance by approximately 50 % relative to early stocking.
- Periods "out" in a rotational grazing procedure do not adequately compensate for vigour loss caused by grazing. The above three trials were carried out under simulated rotational grazing, cutting at predetermined intervals and rotational grazing respectively. This, along with results from Barnes & Denny (1991); Gammon (1978a; 1978b; 1978c) and Gammon & Twiddy (1990) indicate that grazing procedure (number of camps, periods in and periods out of camps) is relatively unimportant in terms of the effect on veld.

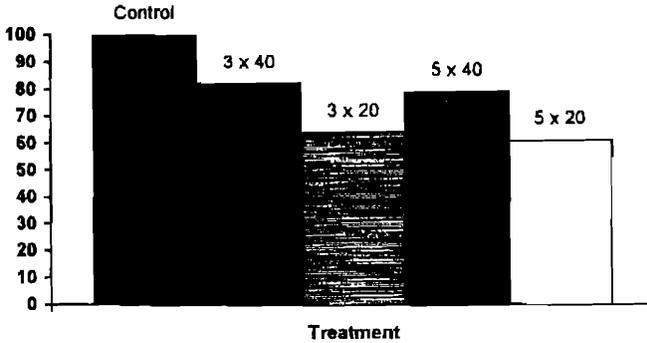


Figure 2 Effect of defoliation by cutting on the yield of *Themeda triandra* during the season following treatment application. Expressed as percentage of the ungrazed control.

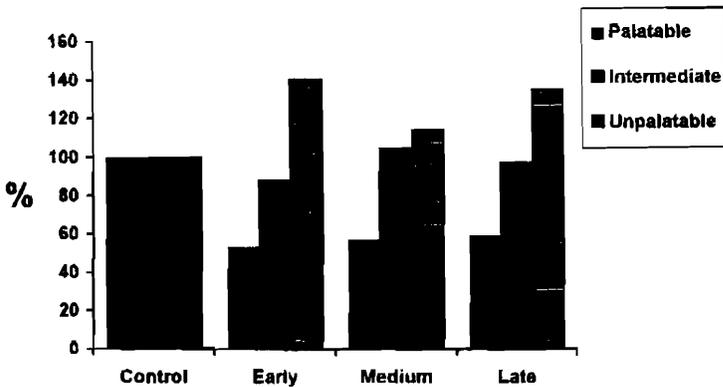


Figure 3. Vigour of veld grass grazed by sheep with three times of stocking after spring burning. Expressed as percentage of the ungrazed control.

- Results from current unpublished research indicate that, while increasing stocking rate has a greater negative effect on vigour, even grazing at light stocking rates has a serious detrimental effect on vigour of preferred species. Also, cattle have virtually the same negative effect on veld vigour as a whole, although the negative effect of cattle on the vigour of preferred species is smaller than in the case of sheep.

4 Compensation for vigour loss

It seems that any grazing, by sheep or cattle, irrespective of grazing procedure, will result in a decline in vigour of particularly the preferred species. The only way to compensate for this severe loss of vigour caused by grazing is to implement periodic long term rests (i.e. full growing season rests).

5 Incorporation of resting in veld management

Results indicate that veld that has rested for a whole growing season, produces significantly more during the season following the rest than veld that has not rested (Barnes & Dempsey 1992). Current unpublished research results reinforce this. In particular, the production of preferred species can be more than double that in comparable veld that has not been rested. This enables a stocking density higher than the long term average to be maintained during the season that the veld is being grazed after a full growing season rest. Experience has shown that if the correct proportions are rested, the stocking rate of the farm need may not need to be reduced when implementing resting, provided the farm was not overstocked initially.

Indications are that winter grazing of veld rested during the growing season has little or no effect on the veld. This rested veld is thus available for winter grazing, and can provide cheap roughage for dry animals (even on local sourveld). Results from local trials over three years indicate that pregnant ewes can be successfully wintered on rested veld with appropriate levels of lupin or soybean supplementation, at a cost of about 8 - 9 cents per ewe per day. Subsequent lamb birth mass and lamb performance up to weaning have been entirely satisfactory.

A veld management system based on full season rests in alternate years has been successfully implemented for five years on a demonstration unit farm, with positive results for veld condition, animal performance, fodder flow and economics. In addition, similar management principles have been successfully implemented for several years in six production systems on Athole Research Station, also with positive results.

6 Conclusions

Research is an ongoing process, and consequently new ideas are generated from new results, new research methods and new trials. Research is not complete until results are evaluated and, if suitable, implemented in practice.

From these results outlined above, along with the experience gained with the implementation of new management strategies based on these results, certain principles stand out.

- Any grazing has a negative effect on veld vigour, and in particular the vigour of preferred grasses.
- Number of camps per group of animals, and periods in and periods out of those camps within a season are relatively unimportant in terms of the effects of grazing on veld vigour.
- Deferring grazing at the beginning of the season is also relatively unimportant in terms of compensating for vigour loss, but leads to a marked decline in sheep performance.
- Grazing management systems should incorporate periodic long term rests (full growing season rests) as a means of compensating for vigour loss caused by grazing.
- This rested veld can form a source of cheap roughage for winter use with appropriate supplementation.
- Detailed veld management recommendations based on the above principles have been developed for various scenarios and applied successfully. Further information may be obtained from the author.

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