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3. THE ROLE OF THE BROWSER IN THE BUSHVELD OF THE EASTERN CAPE 3. DIE ROL VAN DIE STRUIKVRETER IN DIE BOSVELD VAN DIE OOS-KAAP

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ABSTRACT

The role of the goat in the development and utilization of the optimum production potential of the bushveld regions of the Eastern Cape is discussed. It is important to distinguish between two types of bushveld: (1) Valley Bushveld and (2) dry thornveld. In the Valley Bushveld the emphasis lies primarily on preservation but at the same time achieving effective utilization of the valuable shrub component of the vegetation. These objectives are achieved by employing goat farming as the primary enterprise. In the dry thornveld the main objectives are the effective utilization of the grass component and the control of encroaching *Acacia karroo*. The full production potential of the thornveld areas can be achieved with cattle farming as the primary enterprise and with goats playing a secondary role.

UITTREKSEL

Die rol van die bok in die ontwikkeling en ontplooiing van die optimale produksiepotensiaal van die bosvelddele van die Oos-Kaap, word bespreek. In dié opsig is dit belangrik om tussen bosveldsoorte te onderskei nl. (1) Valleibosveld en (2) die drôë doringveld. In eersgenoemde val die klem primêr op die bewaring maar terselfdertyd doeltreffende benutting van die uiters waardevolle struikkomponent. Hier moet die bok die primêre boerderyvertakking wees by die ontplooiing van die potensiaal daarvan. In die drôë doringveld is die uitgangspunt die doeltreffende benutting van die graskomponent en die bekamping van *Acacia karroo*-indringing. Beesboerdery as primêre boerderyvertakking, met bokke as sekondêre vertakking, word as voorvereiste gesien vir die ontginning van die potensiaal van die doringveld.

INTRODUCTION

Almost 47% of the total surface area of the Eastern Cape Region is covered by bush/grass communities. As a result of climatic differences, large variations occur in botanical composition, growth and agricultural potential, but these communities can nevertheless all be regarded physiognomically as bushveld. The coastal bush and the eastern portion of the Eastern Province Thornveld (Veld type 7 : Acocks, 1953) are characterised by a relatively high rainfall and favourable growth conditions. They are therefore suitable for intensification. As far as the drier areas are concerned, two types of bushveld can be distinguished: (1) Valley Bushveld (Veld type 23 : Acocks, 1953) and (2) dry thornveld. The second category includes the following Veld Types as classified by Acocks (1953) : The Thornveld and False Thornveld of the Eastern Province; Grassveld with invasion by *Acacia karroo*, and the western (dry) portion of the Eastern Province Thornveld (Veld Types 21, 22 and 7 respectively).

Goats have been described as a menace to vegetation and soil, but research has shown that they can play a vital role in the conservation, utilization and improvement of bushveld (Du Toit, 1972 b; Roux, 1973; Trollope, 1974; Aucamp, 1975). The goat possesses certain advantageous characteristics, but it is these very features that have been misused by some farmers. Research has clearly shown that the goat is primarily a browser. Provided sufficient browse is available, the goats' diet will consist mainly of browse—to the extent of 85% in the Valley Bushveld (Aucamp, 1974 a). As browsers, Angora or Boer goats have an important role to play in either primary or secondary farming enterprises in the development of optimum land use systems in the bushveld areas.

VALLEY BUSHVELD

Location and area

The different variations of the Valley Bushveld cover about 1 160 900 ha and together form the largest single Veld Type in Eastern Cape Region. The Valley Bushveld is not continuous, however, but occurs in a series of broad belts running up the valleys of the large rivers that discharge at intervals along the eastern coast.

Climate

The Valley Bushveld is characterised by an unreliable and low annual precipitation averaging less than 500 mm a year. The greatest portion of the rain falls during the period February to April. Drought periods of medium to long duration are of general occurrence. The summer months are dry and hot. Light frost occurs during the winter but temperatures remain sufficiently high to allow growth of the shrubs to take place should rain fall.

Vegetation

The dry climate places exceptional demands on the vegetation. According to Du Toit (1973) the habitat is far more suitable for deep-rooted shrubs than for grasses. Acocks (1953) regards the climax vegetation as being a relatively dense succulent shrub community with a subordinate grass layer.

The dominant semi-succulent shrub layer consists mainly of plants that are edible and palatable. Species of general occurrence are: *Portulacaria afra*, *Rhigozum obovatum*, *Brachylaena ilicifolia*, *Schotia afra*, *Pappae capensis*, *Grewia occidentalis*, *Euclea undulata* and *Ehretia rigida*.

Where the bush is destroyed, it is not replaced by pioneer grasses. Instead, according to Du Toit (1973), a useless false karroid veld develops and it is virtually impossible to re-establish the desirable shrub species.

In spite of the limitations that the environment places on the potential of the Valley Bushveld, certain valuable grass species are to be found. The most important are *Digitaria eriantha*, *Setaria neglecta*, *Sporobolus fimbriatus*, *Eragrostis curvula* var. *conferta*, *Themeda triandra* and *Panicum* spp. These are typical sweetveld species and have the ability to produce large amounts of herbage within relatively short periods. The basal cover of the grasses in the Valley Bushveld is, however, low and their contribution towards animal production is limited.

Utilization

The main objective of grazing management is preservation, but at the same time the effective utilization, of the valuable shrub component. Since Angora and Boer goats are primarily browsers, it follows that the vegetation of this unusual veld type can be utilized to best advantage by these animals. The introduction of selected goats, to form the main

farming enterprise, is a prerequisite for realizing the full potential of this arid area of the Eastern Cape.

Utilization of the vegetation by the goat is spread over a much greater vertical plane than is the case with sheep or cattle. Under conditions of overstocking the goat is therefore able to widen its spectrum of selection, resulting in drastic defoliation of the veld. If forced to do so, the goat can destroy the veld in its attempt to survive. This particular ability of the goat, together with the condition and characteristics of the veld, must be considered very carefully if effective utilization of the Valley Bushveld is to be achieved.

The quality of the feed provided by the Valley Bushveld is such that, provided stocking rates are realistic, Boer and Angora goats are able to select a diet sufficiently high in nutritive value to ensure unrestricted growth throughout the year (Aucamp, 1974a). The manner in which the protein content of the herbage satisfies the requirements of the animals is shown in Figs. 1 and 2.

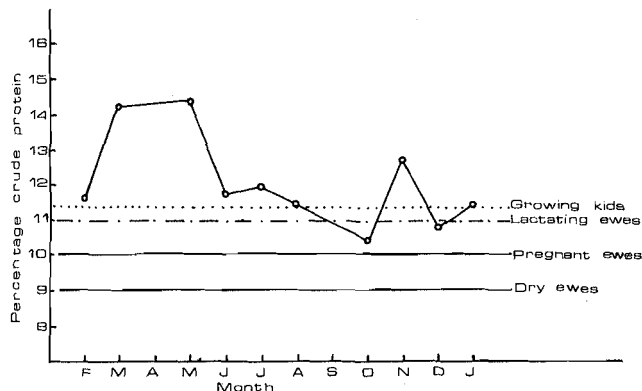


Fig. 1. The crude protein content of the Valley Bushveld as selected by Angora Goats, fitted with oesophageal fistulae, in comparison with their nutritional requirements

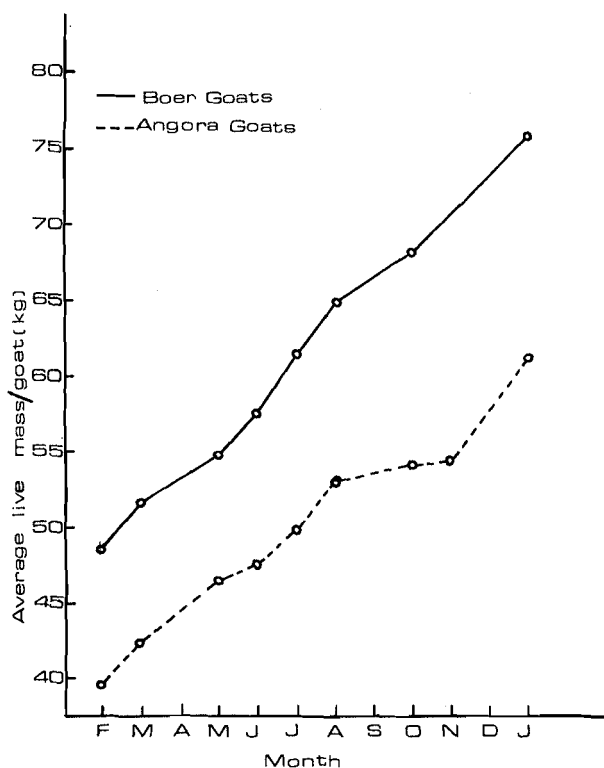


Fig. 2. The live mass gain of Boer Goats and Angora Goats (including mohair production)

The edible bush represents an accumulated fodder reserve and the large quantity of available feed creates a false impression of the carrying capacity of the Valley Bushveld. Research has shown that the amount of dry material actually accessible to animals is about 1 200 kg/ha out of a total biomass of 50 000 kg/ha (Aucamp, 1974 b). It is the quantity of herbage within reach of the animal, rather than the veld types into the grassland (Du Toit, 1972 a; Trollope,

The unfavourable climatic conditions prevailing in the Valley Bushveld, combined with the inherent slow growth rate of the edible shrubs, limit production from this Veld Type. Even under conditions of good rainfall it has been found that *Portulacaria afra* takes 275 days to recover after it has been defoliated by 50% (Aucamp, 1974 c). With the irregular distribution of rainfall recovery could taken even longer (see Table 1).

Valley Bushveld in good condition consists of about 3 700 shrubs/ha of which *P. afra* constitutes about 24%. Although the basal cover of the shrub component of the veld is low (about 0.33%), the crown cover (soil surface in contact with leaf or stem material) is high (74%). Management strategies must be aimed at increasing the crown cover in order to improve the leaf production potential of the shrubs. If continuous grazing is applied at high stocking rates, a stage is reached where the crown cover is the same as the basal cover. Since all the available herbage up to a height of 1.5 m is eaten, only the bare stems of the shrubs remain. This so-called "opening-up" of the valuable bush must be particularly guarded against.

Research in the Valley Bushveld (Aucamp, 1975) has indicated that veld management systems which will provide optimum utilization and maintain the vegetation types effectively must provide for long rest periods. Multi-camp systems are essential to achieve this requirement. Aucamp (1975) has shown that the length of the rest period does not affect the quality of the herbage. The farmer can thus provide long rest periods in order to increase the quantity of forage without sacrificing quality. However, research data (see Table 1) indicate that, for the shrubs, the quantity of leaf produced in relation to woody material does not justify rest periods of longer than 18 months.

The number of goats per unit area must be realistic in that it should be in strict accordance with the quantity of edible shrub material accessible to the animals. Provided the stocking rate is correct and sound veld management practices are followed, the amount of grass will increase to such an extent (see Table 1) that cattle farming can be successfully dovetailed into the goat farming enterprise without the two types of stock competing with each other for feed. Although the data in Table 1 indicate that grasses can play an important role in animal nutrition, it must be borne in mind that much of the grass is inaccessible to cattle since much of it occurs inside the area covered by noors plants (*Euphorbia bothae*) and other shrubs.

An 18 month rest period does not promote maximum grass production. For the effective utilization of this veld type shrubs should be managed separately with goats and the grasses separately with cattle. A camp that is being given an 18 month shrub rest is grazed by cattle while a camp that is being given a grass rest can be grazed by goats. The condition of the shrubs determines the rate of rotation of the goats while that of the grasses determines the rate of rotation of the cattle. In this way the shrub and grass components of the vegetation each receive optimum utilization separately.

DRY THORNVELD

Location and area

The closely related veld types constituting the dry thornveld of the Eastern Cape occur both south and north of the Amatola mountains in the transitional zones between the open grassveld of the mountains on the one hand and the

TABLE 1. The effect of length of rest on quantities (kg/ha) of total biomass (wet material) total biomass up to a height of 1,5 m (wet material) and biomass actually available for grazing (dry material)

Date	12.2.73	30.8.73	12.2.74	30.8.74	24.6.75
*Days after start of rest period	0	199	365	564	862
Total biomass	38 667	48 013	53 596	55 358	
Total biomass up to 1,5 m	24 539	39 825	41 686	44 105	
<i>Available DM</i>					
1 browse	480	605	840	1 074	1 181
2 grass	131	232	548	860	1 850
Total	611	837	1 388	1 934	3 031

DM = Dry material

*Total rest period : 12.2.73–24.6.75

Valley Bushveld on the other. Together thornbush communities cover some one million hectares.

Climate

The annual rainfall varies between 400 and 600 mm. Precipitation occurs mainly during the summer months, often in the form of heavy storms. As evapotranspiration losses during the summer are high, the effectiveness of the rainfall is often low. The winters are dry with desiccating winds and severe frosts. Long-term records show that the rainfall is erratic and that the area is subject to periodic droughts. Good spring or autumn rains are frequently followed by seasonal droughts (Du Toit, 1972 c).

Vegetation

According to Du Toit (1972 b) the transitional zone between pure grassveld and Valley Bushveld was apparently at one time an open grassland, except for the Thornveld of the Eastern Province where bush clumps characterized the vegetation. Over the years bush has spread from adjacent veld types into the grassland (Du Toit, 1972a; Trollope, 1974). Surveys have shown (Du Toit, 1972a) that encroachment is continuing without interruption and that an established bush component of 1 000 to 2 000 trees/ha is present in invaded areas. Various woody species are involved, *Acacia karroo* being the most important and occurring in almost pure stands over large areas. With the large reservoir of seed that has been created, bush can be regarded as a permanent component of affected veld types for the foreseeable future (Du Toit, 1972 a).

The grass component is potentially tall sweetveld with a high feed value even after having reached maturity. The most important species are *Themeda triandra*, *Cymbopogon plurinodis*, *Digitaria eriantha*, *Sporobolus fimbriatus*, *Eragrostis curvula* var. *conferta* and *Panicum stapfianum*. Overgrazed veld is characterized by an unstable stand of *Aristida* and pioneer *Eragrostis* spp. (Du Toit & Aucamp, 1975).

Utilization

In contrast to the Valley Bushveld where the emphasis lies primarily on the effective utilization of the shrub component, the approach adopted in the thornveld is based on the effective utilization of the grass component and the control of *A. karroo* encroachment. Prerequisites for the realisation of the optimum production potential of the thornveld are the introduction of cattle farming as the main farming enterprise and the use of goats in a secondary role.

Various factors have been mentioned as causes of bush encroachment (Scott, 1970; Trollope, 1974; Donaldson, 1975). I am of the opinion, however, that the absence of browsers in animal production systems has been the chief causes of bush encroachment and that the other factors have played a subordinate role.

Defoliation by game was in earlier times spread over the grass and bush layers and under these conditions the balance between the two components was maintained. It is important

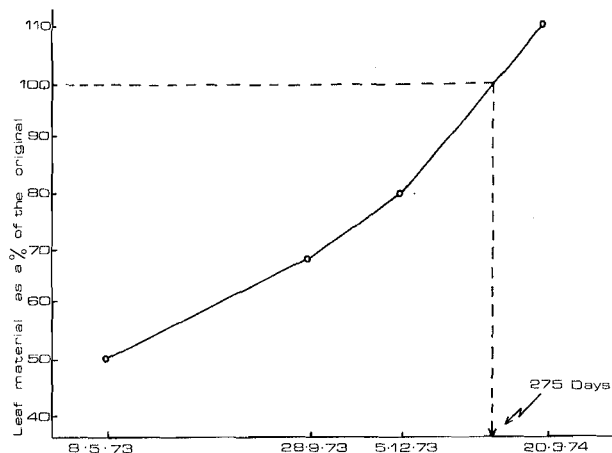


Fig. 3. The recovery rate of *Portulacaria afra* following defoliation.

to note that the two types of game, viz. grazers and browsers, did not compete with each other for feed. This ideal balance has been disturbed by replacing the grass and shrub feeding game with sheep and cattle. Neither cattle nor sheep are browsers. Both are primarily grazers and therefore compete with each other for feed. Where defoliation takes place through only one type of animal the botanical composition changes because one component of the vegetation is eaten and the other not. If bush encroachment is to be prevented, the browser must be brought back into animal production systems. It is here that the goat has an important role to play.

The deleterious effect of competition from *Acacia karroo* on the potential grass production has been thoroughly examined (Du Toit 1968). Because of the prodigious reservoir of seed, the re-establishment of *A. karroo* after bush clearing is a fundamental problem (Du Toit 1972 b). This re-establishment has an important economic effect on any bush eradication programme. Results have shown that neither burning, nor resting, nor judicious grazing management with cattle can prevent this re-infestation but that it can be effectively controlled through use of the goat (Du Toit, 1972 b; Trollope, 1974).

While controlling regrowth of bush, goats are simultaneously able to bring about an increase in production per unit area by utilizing material which would otherwise be uneaten. They do this without any harmful effect on grass production (Du Toit, 1972 b). The goat must therefore form an integral part of any programme of bush eradication.

Because of the unreliable and relatively low rainfall in the thornveld areas, it is essential that stable herbage production should be aimed at and that this form the basis of stable animal production. This is possible only if management and utilization of the veld are designed to use available moisture in the most effective manner for forage production. It is therefore necessary to aim for a plant cover and composition which will yield the highest animal production that the

environment is capable of supporting. The role of the goat as an integral animal factor in the thornveld of the Eastern Cape has been pointed out (Du Toit, 1972b). The precise place of the goat in integrated farming systems (aimed at yielding optimum animal production per unit area), the proportion of goats to other animals in such systems, and the relationships between the goat and its environment, are factors, requiring further study. In the light of this and the need to obtain optimum resource utilization, it is essential that the exact role of *A. karroo* in the habitat as a whole also be determined. In order to achieve this, the following information is required:

1. the relationship between bush density and grass production;
2. the relationship between bush density and total forage production per unit area;
3. the relationship between bush density and total animal production per unit area;
4. the effect of bush density on soil moisture and moisture usage;
5. the effect of the density of bush and grass on soil erosion.

CONCLUSIONS

The goat must form an integral part of animal production in the bushveld communities of the Eastern Cape, either as a primary or secondary line of farming. The role of the goat should be seen not only as a factor in the effective control of bush encroachment but, more especially as an indispensable means of ensuring optimum utilization of the natural resources.

The goat is able to convert into animal products that material which is untouched by cattle.

Provided good veld management, flock management and purposeful breeding are applied, the goat has a bright future in the bushveld areas of the Eastern Cape as an effective means of utilizing and, at the same time, preserving the natural resources.

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