‘Nature’s method of grazing’: Non-Selective Grazing (NSG) as a means of veld reclamation in South Africa

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Acocks was concerned with the past, present and future state of South Africa’s vegetation and in the 1960’s, together with several farmers in the eastern Karoo, developed a grazing system which he thought would restore the vegetation to its former pristine condition. Acocks felt that the grazing systems advocated by the Department of Agriculture at the time were partly responsible for the degraded vegetation of the region as these systems encouraged livestock to graze selectively, thereby overgrazing the more palatable species in the vegetation. He felt that by forcing animals to graze all species non-selectively, the more palatable elements would be able to out-compete the less palatable species and dominate the vegetation as he believed they once did in pre-colonial times. Acocks found theoretical support for his argument which also relied on relatively long rest periods between grazing events and suggested that this non-selective grazing system simulated the way in which the pre-colonial ungulate herds utilised the vegetation. Although Acocks never conducted the key experiments needed to test his ideas, his approach was supported by several farmers in the eastern Karoo who conducted trials on their farms to test the principles of the method. The approach advocated by Acocks, however, was in direct contrast to that proposed by the Department of Agriculture who were concerned about the comparatively high stocking rates advocated under Acocks’ Non-Selective Grazing (NSG) system. Their own experiment on NSG found that it reduced plant cover and increased erosion and they believed that it would lead to further widespread degradation if implemented. Although Acocks was employed by the Department of Agriculture as a Botanical Survey Officer he was not a Pasture Research Officer and it was this latter group of employees who had the responsibility of researching and advocating appropriate grazing systems for South Africa’s rangelands. Acocks was, therefore, instructed not to promote NSG in his official capacity. Despite this, Acocks’ writing in the last ten years of his life is infused with the ideas of NSG which continue to influence the development of range management systems to the present.

Introduction

John Acocks’ universally-acclaimed work on the Veld Types of South Africa was written in 1951 and published in 1953 (Acocks 1953). The breadth of this work, completed in only six years, ensured immediate recognition for its author for the industry and genius it had taken to produce. Acocks, however, was dissatisfied with the final product (see Hoffman and Cowling 2003) and immediately set about revising it with a focus on the more arid western parts of the country. Without the pressure to produce a hastily-prepared report Acocks could return to some of the key themes he had only touched on in the initial publication. One of these — how to restore the veld of South Africa to its former, pre-colonial condition — was to lead, not only to controversy for its author, but also to renewed interest by farmers and researchers in range management theory and practice which continues to the present (Beukes and Cowling 2000, in press, Beukes et al. 2002).

Throughout ‘Veld Types’ Acocks emphasised three main themes, the past, present and future state of South Africa’s vegetation, and his ideas are clearly summarised in the maps produced in this work (Acocks 1953). His entire career was devoted to a study of these three themes which provide a focus for his published contributions. The changes which he saw, in the many hours he spent walking in the veld, were of deep concern to him. He saw signs everywhere which indicated the full extent of the transformation of the vegetation of South Africa as a result of the farming practices of colonial farmers (Acocks 1979). The loss of palatable, climax species, particularly perennial grasses, was his main concern. He was convinced that grasses formed the heart of a productive landscape and should have been dominant throughout the country were it not for the impact of domestic livestock. Acocks considered the loss of grass cover a national tragedy and emphasised this loss at every opportu-
Grazing as a management system it was this episodic, grazing the veld at any one time (McCabe 1987) meant that during these treks, as well as the wide diversity of animals movement of these large herds of animals through an area region (see also Skinner 1993, Dean and Milton 2003). The time to time as part of the extensive springbok 'treks' in the Karoo, Cronwright-Schreiner’s (1925) account suggests this number was substantial (Raper and Boucher 1988). For While the exact number of wild animals which inhabited the veld degradation and by the mid-1960's he was convinced that he had found the answer. He coined the grazing system that he developed, together with several farmers in the region, Non-Selective Grazing, and believed that this approach would restore the vegetation of the country to its former pre-colonial state. Acoks felt that grazing management was of vital concern for every botanist (Acoks 1967a). He emphasised the role of the Botanical Survey Officer which he said was to collect, name and classify plants, to group them into plant formations or veld types and to map the distributions of each species. This work was impeded, however, by the selective grazing habits of domestic animals which seldom gave species palatable to livestock the chance to flower. He was critical of the contributions made by Pasture Research Officers, the group of scientists within the Department of Agriculture who at the time were charged with the responsibility of developing effective economic grazing management systems for the country. He firmly believed that the grazing practices of farmers and the management systems advocated by the Department of Agriculture were directly responsible for the degradation he saw in the veld. Although he never carried out the necessary experiments to test his method he spent more than ten years, centred on the decade of the 1980's, developing and presenting his arguments against these systems, many of which had been started in 1934. Acoks was fully aware of the developments on the Pasture Research Stations having started out as a Pasture Research Stations across the country to develop the most appropriate grazing systems for each vegetation type (Roux and Vorster 1983). Results from the trials advocated the reduction of stock numbers to levels at or below the long-term carrying capacity of the region set by the Department of Agriculture and suggested further that animals should not be allowed to graze continuously on any one patch of vegetation. Two, three, four and five camp systems were thus developed (Figure 1a) which allowed for long periods of occupation of a paddock by fewer animals. Senior officials within the Department of Agriculture, however, thought little of the work of botanists in this regard as they were 'chasers of rare plants, unpractical people who want to mess about with basic research instead of getting on with finding something that will work' (Acoks 1966b). Between 1936 and 1945, when Acoks was seconded to the Botanical Survey to start his work on the Veld Types of South Africa, he retained an interest in the development of grazing systems and carried out many detailed vegetation surveys on Pasture Research Stations such as Towoomba, Escourt and Dohne. When he left to start his Veld Types work in 1945, Acoks took with him a long-standing interest in grazing systems and picked up on the theme again soon after the publication of the first edition of the Veld Types of South Africa in 1953.
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His on-going veld survey work kept him in close contact with farmers and Acocks noted with interest the experiment carried out by Dennis Nel from the farm Sunnyside near Beaufort West in 1953 (Acocks 1966b). To avoid the toxic *Tribulis terrestris* plants which dominated the lowlands, Mr Nel placed all 3 000 sheep in his herd on the remaining 200ha of rocky hills veld for six weeks with no apparent harmful effects to either animals or vegetation. John Acocks was also aware of another farmer, Louis Trollip’s, 1956 experiment on his farm Compassberg where an increase of unpalatable shrubs such as *Elytropappus rhinocerotis* and *Euryops* spp. and unpalatable grasses such as *Merxmuellera disticha* made his farming operation uneconomic. An accidental burn followed by high intensity grazing enabled Mr Trollip to more than double his herd, as unpalatable shrubs were reduced and palatable shrubs and grasses increased on the range.

The development of a grazing system based on the principle of non-selective grazing with long rests finally emerged for Acocks in 1959 when he realised that to achieve this ideal farmers would need to create more paddocks to allow a quick rotation of animals through individual paddocks (Acocks 1966b). But he still needed to determine the appropriate periods of occupation and rest required for a given area. To do this he turned to Len and Denise Howell who were farming near Springfontein in the Free State on a farm called Hillside. The development of NSG as a rangeland reclamation system started here in earnest from 1961. His oft-repeated slogan about the veld being ‘understocked and overgrazed’ (Howell 1966) prompted the Howells to start experimenting with grazing systems. They created 12 relatively small paddocks on their farm and found that if their animals grazed each paddock for two weeks, stayed out for six weeks before grazing it again and then rested it for up to five months thereafter, optimum results for both vegetation and livestock were attained (Figure 1b). Although a series of droughts from 1963 forced the Howells later to refine their approach, to develop even more paddocks and to infuse greater flexibility in their system of range management, the general principle of heavy grazing with long rest periods remained the same.

Word of mouth and a few early publications on the theme (Howell 1962) prompted several other farmers in the district to start experimenting for themselves (see for example, McNaughton 1967, McCabe 1987). Interest in NSG exploded and Acocks corresponded directly with many farmers and several farmer study groups at this time. The practical implementation of NSG, however, had no theoretical foundation and it was to this aspect that Acocks turned his attention in the early 1960’s. By 1965 he had developed what he considered to be a sound theoretical basis for the approach and for the next two years developed a set of principles for the method that he retained, largely unchanged, for the remaining 14 years of his life. Interestingly, he never carried out the

![Figure 1a: One of several three-camp rotational systems recommended by the Department of Agriculture. Stock are moved through the different camps according to the seasons (shading) in which, over a period of three years, all camps have received sufficient rest after grazing to ensure recovery. Such systems, ranging from two to multi-camps, can be most successfully operated when camps are grouped together (see Roux 1968, Roux and Skinner 1970 for further detail).](image1a)

![Figure 1b: A graphical representation of the non-selective grazing system as advocated by Acocks. Alternating heavy defoliation (shading) with variable rest periods under high stocking rates are prescribed (Acocks 1966a).](image1b)
detailed experiments necessary to test the effect of his approach on, for example, animal and plant production, soil properties and erosion but relied instead on whole farm trials for supporting evidence.

The principles of Non-Selective Grazing

Besides simulating what Acoks felt were the natural grazing patterns of early migratory herds, under which southern African plants and plant communities had developed, he sought additional ecological and physiological support for his approach. At the heart of the matter was his belief (Acoks 1966a) that the conventional two, three, four and five-camp grazing systems, with their relatively long periods of stay and low stocking densities, increased the selectivity of the most palatable species. While there is some doubt that he fully acquainted himself with the details of the grazing systems advocated by the Department of Agriculture at the time, he believed nonetheless that they were more detrimental to plants than rangelands that were grazed continuously by large numbers of domestic livestock. Selective grazing was, he believed, the primary cause of the widespread degradation that he observed in South Africa’s rangelands and the approaches advocated by the Department of Agriculture would, in his view, only exacerbate the problem. Even though he never carried out the appropriate experiments, he believed that NSG would eliminate this selectivity and proposed that by stocking heavily for short periods, all species would be grazed equally. This brief, high stocking density period under NSG would, he believed, eliminate the competitive advantage unpalatable species enjoy under a selective defoliation regime and the recruitment of palatable species would subsequently be enhanced. Acoks’ observations on the NSG farms that he visited supported his views.

Acoks (1966a) also found support for NSG in physiological models which described the post-defoliation allocation of stored, non-structural photosynthate (Weinman 1955, Troughton 1957). Acoks adopted the root-reserves theory (see Brown 1985) and used a ‘depletion-replacement’ model to explain the movement of photosynthate following defoliation. He relied exclusively on the experimental observations of Sullivan and Sprague (1943, 1953) and, based on these data from annual C₃ pasture grasses (no work had as yet been carried out on the more robust C₄ African grasses), Acoks (1966a) suggested that after defoliation, plants draw on soluble carbohydrate root reserves to produce new growth. Furthermore, 21–22 days were needed for this new photosynthetically-active material to produce enough photosynthate to replenish depleted root reserves. Repeated defoliations, however, prior to full replenishment, which occurs under a selective grazing regime, ultimately exhausts the reserves and the plant dies. The periods of occupation and rest are thus crucial to the theoretical considerations of NSG.

Armed with what he believed was a sound theoretical framework Acoks developed four key principles for NSG (Acoks 1967a). Firstly, he suggested that the grazing period should be short enough to prevent the depletion of the root reserves of especially the palatable plants. Secondly, the period between grazing should be long enough to enable the replenishment of the root reserves of the key, palatable species. Thirdly, the rest period should also be long enough to allow palatable plants to produce seed during the appropriate season. Finally, within practical limits, the stocking density should be high enough so that all plants, including the unpalatable species, are evenly grazed during the short grazing period.

In practical terms Acoks (1967a) provided the following guidelines for each of the four principles (Figure 1b). Evidence from the farms that he visited indicated that the maximum grazing period should not exceed two weeks, while the period between grazing, ‘to keep veld vigorous’ should be about six weeks. He suggested that eight to 10 weeks was enough time to allow for seedling. He cautiously suggested as a guideline that a stocking rate of one sheep per morgen for every inch of average rainfall would achieve the desired non-selective grazing effect provided that at least 12 paddocks per herd were available. In practice, a paddock would be grazed twice, for two weeks at a time, separated by six weeks and then rested for five months before being grazed again.

For farmers serious about NSG several additional and perhaps impractical guidelines were recommended (Acoks 1966a). Before starting on NSG, a 12 month rest period was advised. In addition, a start with NSG should only commence once good rains had fallen. Also, if there were no climax species remaining in the veld then these should be re-sown at a density of one plant every 2m to 3m. Since NSG forced animals to graze the vegetation non-selectively, supplementary feeding was recommended to maintain animal condition, particularly during the early stages. Advice about burning and the protection of ‘soft plants’ such as Portulacaria afra was also provided in his seminal paper read out to delegates of the first congress of the Grassland Society of South Africa in February 1966 (Acoks 1966a).

The controversy around Non-Selective Grazing

Although Acoks’ 1966a publication is the only peer-reviewed, scientific article he produced on NSG, several unpublished reports and popular articles provide additional insight to the development of his thinking about NSG (see for example, Acoks 1966b, 1966c). Also, his letters to a wide range of correspondents are everywhere infused with his ideas on NSG, particularly during the 1960’s. This concern for NSG prompted his line managers within the Botanical Research Institute to remark with despair in 1968 that his annual progress report contained little information on his registered project (a revision of Veld Types) but ‘...invariably gives most information about non-selective grazing.’ His continued belief in the importance and power of NSG as a tool to reclaim the degraded rangelands of South Africa also emerges in all of his subsequent articles, some of which were heavily edited prior to their final publication (e.g. Acoks 1967b, 1976, 1979). In addition to Acoks’ considered publications on NSG, however, there was a flood of popular articles by other writers, primarily in the English-language Farmer’s Weekly and other popular agricultural journals (e.g. Howell 1966, 1967a–f, McNaughton 1967) and
particularly from 1965 to the end of the decade. The Afrikaans agricultural press was less effusive although a few accounts were published (e.g. Anonymous 1969). Denise Howell, in particular, wrote comprehensively about NSG providing both theoretical and practical details of the system they had helped develop (Howell 1966, 1967a–f). Her contribution to firing the imagination of the farming community should not be underestimated and since she and her husband Len Howell were at the forefront of the development of the system she wrote with authority and conviction about both the positive and negative aspects of NSG. She also maintained a productive and extensive correspondence with the agricultural Director of the Karoo Region, Dr Piet Roux, whose important and scientifically-rigorous contribution to the debate has yet to be properly acknowledged. Correspondence and articles from local farmers, mostly in support of NSG, poured into the Farmer’s Weekly and other agricultural magazines at this time and the ground swell of support for the idea of NSG was clearly widespread. Acocks himself remained relatively aloof from the sometimes heated debates in the agricultural press, preferring to meet with the occasional farmer study group in the field or correspond with individual farmers over specific problems that they had found with the system.

Acocks could not, however, avoid the attention of the Department of Agriculture since NSG blamed the conventional grazing systems, developed and advocated by the Pasture Research Officers within the Department, directly for the state of the rangelands in South Africa. In the eyes of the Department, however, the widespread practice of NSG was considered dangerous for the future conservation status of the region. The Karoo had just emerged from a period of very high stocking levels between 1920–1940, which had seen much of the area lose plant cover and topsoil. The 1946 Soil Conservation Act sought to restrict the number of animals on the range and the Stock Reduction Scheme introduced in the 1960’s (Van der Merwe 1974) also required farmers to reduce stock numbers by a third before they were able to qualify for state subsidy during the drought of the 1960’s. Soil conservation planning had taken root across the country and the Department was keen to see it broadened and strengthened. Because of the increased demand for fencing under NSG, officials within the Department of Agriculture were also concerned that the system would threaten the state fencing subsidy scheme. By advocating high stocking rates, in their eyes, NSG had the potential to undo all the efforts that had so painstakingly been put in place during the previous two decades. Most importantly, there was no experimental evidence to support the claims of NSG.

Prompted by several articles which appeared in the popular agricultural press in the early 1960’s, the Department of Agriculture requested Acocks to elaborate on his ideas and to substantiate some of his claims concerning NSG. He completed his reply in August 1965 and used this as the basis for his 1966 address to the Grassland Society of South Africa. This article was immediately sent to Pasture Research Officers in the Highveld and Natal Regions for comment. Responses were mixed. While it was suggested that Acocks’ ideas were ‘nothing new’ and had already been advocated by the Department in the 1930’s and 40’s, some respondents felt that NSG would result in the eradication of all desirable species. The general consensus, at least from the Natal Region’s Pasture Research Officers was that it would be worth testing out in various Veld Types. Over the next few months Acocks drafted a detailed response to each and every query raised by the different regions. In 10 typed pages to Professor Scott at the University of Natal, Pietermaritzburg, for example, Acocks went to great lengths to explain his main principles further and provided extensive practical examples of why he thought his approach was suitable as a grazing system.

Acocks produced several additional articles on the theme of NSG between 1966 and 1967 (Acocks 1966a, 1966b, 1967a, 1967b). Support for the system within the farming community continued to grow and the Department grew increasing anxious that NSG would scupper their well-developed proposals to enforce conservation in the country. Their own experiments on NSG (Roux 1967) (and the only experimental test of the principles of NSG carried out in South Africa prior to the work of Beukes (1999)) had shown it to be a complete failure which would lead to widespread degradation if advocated and implemented by the Department. In the experimental trial on NSG carried out at Grootfontein plant cover was reduced under the high stocking densities proposed by the NSG system and soil erosion and livestock foot paths were significantly greater in NSG paddocks than in paddocks with lower stocking densities.

The Department of Agriculture was convinced that NSG would be the ruin of South Africa’s rangelands and decided to act. In an article published in Agricultural News on 28 July 1967 and again in September in Farming in South Africa the Department’s attitude towards Non-Selective Grazing management and utilisation was spelled out. The article welcomes the debate and based on the results of its own research programmes questions some of the basic principles of NSG. It bemoans the fact that few farmers have any grazing system in place at all and states that it is ‘...at present unable to make any specific recommendation regarding [NSG].’ It warns, however, that ‘...to avoid serious damage to the veld, injudicious application of [NSG] must be strictly guarded against.’

Four days before the publication of this article, however, a letter from the Department of Agriculture was sent to Acocks’ superiors in Pretoria. In this letter they are told that Acocks ‘...should refrain from making positive, specific recommendations in advocacy of any particular system or method of grazing management, and he should ensure that he remains within the bounds of the Department’s statement in this regard.’ He is further instructed to send copies of all his technical correspondence with the public to his line managers who are then asked to send it on to the ‘Chief of the particular [agricultural] Region from which the enquiry emanated.’

Although the same brief states that the Department does not wish to ‘...muzzle any of its officers...’ this is effectively what happened. It is not surprising that Acocks did not publish anything else directly on NSG and for the next few years at least his correspondence with individual farmers concerning NSG always ends with the statement that his views are given in his personal capacity and should not be construed
as reflecting those of the Department of Agriculture. He also
grew tired of the controversy and except for one final
address on NSG to a grazing management conference
organised at Grootfontein in November 1967 he never spoke
publicly on the theme again. He continued to visit farmer
study groups, however, and walked with farmers in the veld
sharing his views on the most appropriate systems of graz-
ing. His friendship with several farmers in the region who
continued to experiment with NSG also provided an outlet
for his ideas and observations.

His revolutionary approach to grazing had also sparked
the imagination of several range scientists who began to
publish on the theme soon after his 1966 Grassland Society
of South Africa address (Booysen 1969, Roberts 1969).
They usually offered Acocks the courtesy of commenting on
early drafts of their manuscripts and Acocks usually obliged
with direct and scathing criticisms of their interpretations of
NSG.

Non-Selective Grazing today

The shift by the Howell’s from a standard 12 camp layout to
a 16 camp layout from 1966 signalled a shift in their philo-
sophical approach as well. NSG began to be subsumed
within the general concept of short duration grazing (SDG)
where the emphasis fell on grazing palatable species often
to increase production and vigour. Allan Savory’s influence
on southern African range ecology also started at this time
(Savory 1967, 1988) and his wagon wheel layout and fast
for his ideas and observations captured the imagination of sever-
al farmers in the region. Savory (1988) has graciously
acknowledged the important influence that Acoks had on
the development of his own thinking. With Acoks no longer
able to advocate NSG directly and with clear differences of
opinion between him and other former advocates of NSG
emerging Acoks returned to his prime responsibility — to
complete a revision of the Veld Types of South Africa. He felt
that he had spent too much time, thought and energy on try-
ing to explain NSG to Pasture Research Officers and farm-
ers and his energy was re-directed again to his life’s work.
However, Acoks continued to believe that NSG was the key
to veld reclamation and expressed these views wherever he
could, in published papers, reports and private correspon-
dence. However, Acoks had no interest in stirring up the
controversy again while the region was in the grip of one of
the longest droughts in living memory. He declined at least
two invitations to talk on the theme in the early 1970’s pre-
fering to let the vegetation ‘talk for itself’ once the drought
had broken. However, even after the widespread heavy
rains which fell across South Africa between 1974–1976
Acoks refused to be drawn on the theme and busied him-
self instead with completing his revision of Veld Types. NSG,
however, continued to influence his writing and many of the
core ideas around NSG are expressed in his later publica-

After John Acoks’ death in 1979, interest in NSG dwin-
dled although a few farmers continued to write about its suc-
sesses (e.g. McCabe 1987). A comprehensive experimental
test of the effect of NSG on ecosystem processes (Beukes
and Cowling 2000, in press) and economic viability (Beukes
et al. 2002) has recently emerged (see also Burger 2001).
Interest in NSG is likely to continue for decades to come and
it is hoped that future contributions will be mindful of the
important role that John Acocks played in the debate.

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