The Australian Rangeland Society

RANGE MANAGEMENT NEWSLETTER
An official publication of The Australian Rangeland Society
ISSN 0812-4930

Citation
The material in Rangeland Management Newsletter has not been subject to peer review and may not be acceptable to some editors.

If cited it should be in the form:
Bastin, G. and Allan, G. (2012). After the smoke has cleared: 2011 fire in Central Australia. In: Range Management Newsletter (Ed. N Duckett). 12/2:3-6. (Australian Rangeland Society: Australia).

Range Management Newsletter

Official newsletter of the Australian Rangeland Society

Editor – Dr. W.H.Burrows, Charleville Pastoral Laboratory, Hood St., Charleville, Queensland 4470.

No. 77/1 March 1977

EDITORIAL

It has been a privilege for me to have had the responsibility of editorship of the Range Management Newsletter for the first six issues. Most new organizations start rather tentatively, and always very hopefully, and the Australian Rangeland Society is no exception. Fortunately there had been some degree of "togetherness" formed with the conduct of several "Range Condition Workshops" and the publication of the Arid Zone Newsletter and the Range Assessment Newsletter. This was followed by the inauguration of the Society with an excellent Council. When you look back over the past two or so years, we have come a long way as a Society, and this is reflected in the content of the Newsletter.

At times there has been a dearth of suitable material in the Editor's hands by the deadline, but over the past few issues there has been an excellent response from the membership. This is no doubt helped greatly by the activities of new regional groups within the Society. It is my belief that the real strength of the Society will always lie in active membership groupings scattered across our vast continent.

I hope that you will give the new Editor, Dr. Bill Burrows, the fullest support. I would like to remind each member that if he or she makes only one contribution to the newsletter each year, then its success will be assured.

I will seek to give the Society my continued support, and no doubt there will be plenty of opportunities to do this.

GRAEME TUPPER
Retiring Editor

Deadline

Copy for the next issue of the Newsletter is required by 31st May 1977. Address all correspondence concerning contributions to:

Dr. W. H. Burrows, Charleville Pastoral Laboratory,
P.O. Box 282, Charleville, Queensland, 4470.

ANNUAL GENERAL MEETING

The Annual General Meeting of the Australian Rangeland Society will be held on Friday, 27th May at the CSIRO Division of Land Resources Management, Wembley, W.A. at 8.00 p.m. The main business will be the election of Office-Bearers. A separate notice has been posted to all members asking for nominations for the positions of Vice President, Honorary Secretary, and Honorary Treasurer.

You are reminded that nominations must be in the hands of the Secretary no later than April 15.

GENERAL MEETING OF THE SOCIETY
Broken Hill - July 8th, 1977

Members (totalling 60+) from all States will attend this meeting. Any other intending participants are asked to let Mr. A. L. Payne, Department of Agriculture, Jarrah Road, South Perth, W.A. 6153, know of your intentions as soon as possible.

Working papers for the meeting are still arriving in Perth. A new absolute deadline of 28th March has been set.

There are two field trips associated with the meeting:

(1) Pre-meeting tour - 7th July (all day). The Fowler's Gap Research Station Consultative Committee have generously offered to allow all Society members attending the meeting to participate in their Field Day.

(2) Post-meeting tour - 9th July (all day). The local organizing committee are organizing a field trip of some 200 km to the north of Broken Hill. It will include Old Corona, an historic homestead of the area, and the Mundi Mundi Plain experiments being conducted by the CSIRO Division of Land Resources Management. This tour will travel through a number of different vegetation types.

A registration fee of about $20 will be required to cover lunches etc. for the two field trips and the meeting. A lower charge will be set for those unable to participate in all activities.

FORMATION OF SOUTH AUSTRALIAN BRANCH OF THE A.R.S.

On the 27th January 1977 a meeting of those members and others interested in the Australian Rangeland Society was held in Adelaide. The purpose of the meeting was to -

(a) Publicise the existence of the Society and its aims amongst people and officers with a practical and professional interest and involvement in rangeland resource use and management.

(b) Determine the response of S.A. members of the Society to the suggestion that a State Group or Committee be formed in South Australia to initiate and organize Society activities in this State.

It was chaired by Mr. Rod Everett, a member of the Pastoral Board of South Australia, who had previously circularized notice of the meeting to about 100 members and potential members. Thirty eight (38) people had formally accepted this invitation to attend. Altogether 52 people were present. They were drawn from the total spectrum of both rangeland and natural resource use and management endeavour.

The meeting was structured in three parts. Firstly, there were four short papers. Brendan Lay gave the scope and aims of the Society; Don Nicolson presented a pastoralist's viewpoint on the advantages and need for the Society; Bob Lange presented a viewpoint from the academic sphere, while Jim Vickery spoke as a rangeland administrator.

The second part was a general discussion session by those present. Many viewpoints and suggestions were expressed.

Finally, formal motions on the formation of a South Australian Branch were put to the vote and carried unanimously. Office-bearers within the S.A. Branch were also elected. They are -

President:	Mr. Don Nicolson, Roopena Station, Whyalla.
Vice President:	Mr. M. Andrew, Botany Department, University of Adelaide.
Secretary/Treasurer:	Mr. B. Lay, Department of Agriculture.
Committee:	Mr. J. Vickery, Pastoral Board, Department of Lands.
	Mr. L. P. Lord, Kolendo Station, Port Augusta.
	Mr. T. Fatchen, National Parks and Wildlife Service.

Subsequently the committee met, and it is currently examining activities which may be suitable for a meeting of South Australian Branch members. The feasibility of producing a Branch Newsletter or occasional publication is also being studied.

PROPOSED WORKSHOP ON SOCIAL AND ECONOMIC THEORY IN THE ARID ZONE

A workshop to discuss the relevance of social and economic theory to arid zone problems is being planned for early 1978. The workshop will be highly technical and confined to those people who have experience in the application of social and economic theory to arid zone problems.

Details can be obtained from Mike Young, CSIRO Division of Land Resources Management, Private Bag, P.O., Deniliquin, 2710.

REVIEW OF SELECTED FIELD TECHNIQUES IN RANGE SCIENCE

The Department of Primary Industries in Queensland has printed copies of a review of the most widely applied field sampling techniques used in range science field studies. The review is the work of Brian Roberts and one of his former post-graduates, F. V. Bester and was made available for publication at the request of Agriculture Branch of the D.P.I. in Brisbane.

A limited number of copies of this review entitled - *Techniques for measuring range quality, yield and utilization* - are available from Mr. Don Cameron, Assistant Director, Agriculture Branch, Department of Primary Industries, William Street, Brisbane, 4000.

DIVISION OF LAND RESOURCE MANAGEMENT, S.A.

Approval has been given for the creation of a Division of Land Resource Management within the South Australian Department of Lands. Further information will appear in a later issue Newsletter.

GRADUATE DIPLOMA IN NATURAL RESOURCES

A *one-year graduate diploma course in natural resources* commenced at Roseworthy Agricultural College of Advanced Education in the 1977 academic year.

The Diploma provides for three main categories of students, viz:-

. Those graduates of some years standing who are working already in the area of natural resources and are looking for refresher or updating training.

- Those students planning to specialize in natural resource management after completion of a Degree or Diploma in Agriculture, building on the biological, ecological and economic principles studied at the undergraduate level.

- Students who have a tertiary qualification in an appropriate field other than agriculture who wish to extend their studies at a post-graduate level to natural resources in the agricultural context offered at Roseworthy.

Students will complete a study programme covering four main subject areas as follows:

1. The natural resources - an inventory of the national estate and the definition of the natural resources of Australia in general and South Australia in particular, including methods of monitoring and measuring natural resources.

2. The impact of man on the natural resources of land, water, fauna and flora through agriculture, forestry, recreation, and utilization for other purposes such as transport, pipelines, power lines and mineral, urban and industrial development.

3. Economic issues in controlled utilization, conservation, protection and reclamation of natural resources.

4. Social and legal issues in the responsible use and management of the natural resources.

In addition, a major project is undertaken in a field relevant to the area of study and within the general framework of the teaching resources of Roseworthy Agricultural College.

Priority in the first instance is given to those projects related to areas of study at the interfaces between agriculture and the natural resources of land, water, fauna and flora.

In 1977 there are five students including interests in watershed management, the fate of livestock medications, and environmental protection in general.

In the light of experiences with the Graduate Diploma in Natural Resources in 1977, it is anticipated that in 1978 a *three-year course leading to a Diploma in Natural Resource Management* will commence. This will run parallel to, and share approximately one third of work in common with, the course in Agriculture.

Further information can be obtained by writing to Dr. R. (Bob) Stefanson, Roseworthy Agricultural College, Roseworthy, S.A. 5371.

FIRE ECOLOGY AND FIRE MANAGEMENT WORKSHOP

From: Strider, Camp Concern, C/o P.O., Humpty Doo, N.T. 5791.

This will be a residential workshop under camping conditions, running from Sunday 22nd to Monday 30th May, 1977. The emphasis will be on local participation, and the workshop is seen as the first in a series of indefinite number with at least an annual frequency.

As a first workshop I hope it will lay a firm foundation for later meetings. In detail I expect a comprehensive inventory of resource persons and of the relevant literature, hopefully in a "directory form" that we can publish.

With that task out of the way, the form, origin and rationale of the present fire regimes in Central Arnhem Land will be investigated. The present fire regimes being contrasted with the traditional Australian ones, and the effect of feral water buffalo on fuel stocks being isolated from the rest of the "change complex".

My main objective is to provide a colloquial briefing on the issues involved for the resident full time students in this "School of Ecology".

We shall be on the look out for practical advice connected with our domestic fire management program here at Camp Concern, and for remarks that may point to worthwhile small scale burning experiments in the Camp area.

Postal participation in the workshop is being encouraged, particularly in the areas of -

1. Inventory of the literature
2. Interaction of grazing animals and fire
3. Fire frequency and soil nutrient stocks
4. Pre-European fire regimes.

The registration fee for "on site" participants is $10, for "postal" participants $2. This budget is to cover sound tape recording only.

Further information is available from the address mentioned at the top of the article.

ASSIGNMENTS WITH INTERNATIONAL AGENCIES

The Department of Employment and Industrial Relations through its Professional Employment Offices, assists in the recruitment of technical experts and consultants for aid projects in developing countries carried out by the United Nations and its major specialised agencies.

The Editor of the Range Management Newsletter is receiving a summary of vacancies each month, and if any of these vacancies are relevant to the membership of the Society, they will be listed in the quarterly Newsletter. However, members who may be interested in either short or longer term overseas assignments, are advised to contact the Professional Employment Office in the nearest capital city, for the purpose of obtaining and lodging a personal history form with the Office so that they will be informed directly of suitable vacancies.

The current listing includes:

Senior Economist, Rome, 3 years, FAO.
Adviser to the Agricultural Department, Liberia, 1 year, UNESCO.
Economist/Planner, Afghanistan, 1 year init., UNTARS.
Land Tenure and Settlement Officer, Accra, 3 years, FAO.

COMMENT

RECORDING OF POINT QUADRAT DATA

From: Alex R. Williams, Health Physics Research, Australian Atomic Energy Commission, Private Mail Bag, Sutherland, N.S.W. 2232.

Guy Robinson's report on the recording of point quadrat data in R.M.N. 76/4 of December 1976 invites a piece of basic criticism which may be applied to ecological measurement in general.

Measurement in all the sciences is subject to the same rules. A measuring device is used to produce numbers. Before any two numbers can be compared, two requirements must be fulfilled:

(a) they both must relate to the same quantity,

(b) the variance associated with each separate measurement must be known.

If these conditions are fulfilled then the difference between the two numbers is counted to be real only if it exceeds the probable difference due to error.

Robinson compared three methods of scoring point quadrats by examining the mean values produced, and concluded that one of them was best because it was faster than the other two, as all produced a similar set of mean values. He further concluded that none of the methods were biased toward erect or prostrate plants and that all three methods were satisfactory for detecting botanical change over time.

The three methods of scoring that he used estimated:

(a) live foliage density in the outer canopy
(b) crown density
(c) relative frequency

The three methods all measure different quantities and under the rules of measurement it is not valid to compare them. A comparison is valid only if they are all assumed to be estimates of the same quantity, which in this case could be "above ground biomass", "basal area density" or "relative frequency", three quantities that are generally accepted to be properties of the pasture sward. Robinson chose to convert them all to estimates of relative frequency and so fulfilled this requirement. However, his method (a) gives information only on the outer canopy and ignores lower levels of the sward. This would remain valid as a measure of the total sward in a pasture dominated by erect perennial tussock grasses such as *Sporobolus elongatus* and *Themeda australis* or in a closely grazed pasture where there is only one layer of herbage. However, in a pasture where lush growth of grasses and legumes (e.g. *Trifolium repens*) occur together one would expect a strong bias toward the scrambling broad leaf legume, in which case the method is no longer a measure of the total sward. It may still be a useful measure, but it can no longer be compared to the other methods which measure properties of the total sward. This is possibly the weakness in the method which Robinson says his critics have pointed up. If so then his refutation is a red herring and does not address the real point at criticism at all. He did not state the criticism he was replying to, however, so the issue remains unresolved.

Assuming, however, that the data presented do address a valid problem of comparison, it is impossible to draw any conclusion about the reality of any difference in the numbers themselves, either between methods, or with one method between different years, because no estimates of variance for any method were made. If the variance is small then the numbers presented are probably quite reliable, but if the variance is large (as I suspect it is) then the apparent agreement could be entirely due to coincidence.

I would like to suggest an alternative approach as follows. To compare two or more methods of scoring, repeat each method as many times as practicable, but score only the dominant species. Then take the data for each method and examine its frequency distribution. Calculate a measure of dispersion for each method (e.g. the standard deviation for a symmetrical distribution or the mean deviation or inter-quartile range for a skewed distribution) and then compare the methods on the basis of both ease of use, and the measure of dispersion among the results produced.

To examine different methods for bias toward erect or prostrate plants repeat the same procedure, but score only one erect species and one prostrate species and then compare the averages as well as the measures of dispersion.

To measure variation from year to year using one selected method of scoring one must construct a distribution function from which the variance of any particular single measurement can be estimated. There are two ways of doing this. One is to assume that a standard distribution fits your method. For example, von Broembsen (1965) has shown that the binomial distribution fits point quadrat data when point spacing exceeds plant aggregate diameter; in this case the variance of any measurement would be estimated by

$$\sigma_A = n\,p\,g$$

where n = number of points
p = proportion of hits for species A
q = proportion of misses for species A
and $p+q = 1$

The other way is to take a series of independent samples covering a wide range of plant species abundances and calculate the variance for each species, then construct a curve of species abundance against variance and use this to estimate the variance of any future measurements.

I hope that these suggestions will be of some use and would like some comment in return. The problem of estimating variance in vegetation measurement is not yet generally resolved, but a bad estimate is better than none at all, and unless we conform to the rules of measurement then we are deceiving ourselves as well as the public whom we serve.

Reference

von Broembsen, H.H. (1965). A study of the point method of vegetation measurement by means of an electronic analogue apparatus. *Proc. IXth Int. Grassl. Congr.* Vol.2: 15; op; 560a.

MULTICAMP GRAZING SYSTEMS IN SOUTH AFRICA - SOME IMPRESSIONS

From: Vic. R. Squires, CSIRO Division of Land Resources Management, Alice Springs, Northern Territory, 5750.

South African pasture managers believe that although it is possible to arrive at a long term optimum stocking rate, it is unwise to attempt to maintain the stocking rate permanently at a certain level. This philosophy is in contrast with the preoccupation of Australians who insist on 'a fixed number of animals on a fixed area'. In this respect Australians are out of step with most other range management workers the world over. Perhaps because we reject the idea of 'grazing days' and generally deny the value of 'put-and-take' grazing systems, we are the worse for it.

Especially in the drier parts of the country the rangeland varies considerably from year to year, depending on climatic conditions. For optimum production, it is essential that the stocking rate be adjusted to the carrying capacity and the early adjustment of stock numbers is a fundamental requirement for success in range management. Suitable grazing systems must be found which will allow stock numbers to be varied in accordance with the fluctuations in carrying capacity.

Realization of this fact has led South Africans to consider the factors which could contribute to better systems of grazing management than can be achieved under continuous stocking. These systems have come to be known as 'multicamp systems' and have evolved over the past 15 years.

The principal advantage claimed for multicamp systems is that they are useful in counteracting varying climatic conditions and in producing a grass cover in poor years and in cycles in which unseasonal rains favour forbs (weeds) rather than grass growth. The basic principle behind these schemes is to avoid two of the most serious deficiencies in conventional continuous grazing systems, namely - species

selective grazing and area selective grazing. In our terms, the tendency for livestock to graze certain palatable grasses to the point where they are destroyed while the inferior species are increasing, or to graze certain areas of a paddock (a particular eco-unit) to the exclusion of others. This situation leads to what South Africans recognise as being 'understocked and overgrazed'.

One of the outcomes of recognising the dangers of being understocked and overgrazed was to develop a system of grazing which embodied heavy relatively non-selective grazing (NSG) (make them eat everything). A later development was the controlled selective grazing (CSG).

The underlying principle in both schemes was that the grazing period should be as short as possible. Long grazing periods allow the stock to graze the more palatable species repeatedly during the growing season. (Under this type of species selection, the repeated removal of young regrowth will reduce the vigour of the plant and eventually the more palatable species will be unable to compete with the less palatable ones and will die out.). The grazing period should be short enough to ensure that the animals are removed from the paddock before the regrowth from the palatable species has reached a grazeable height. The ideal length of the grazing period is governed by the rate of regrowth of the plant and may be as short as three days during periods of most rapid growth. The animals should not be interrupted by drought or cold weather, until growth has stopped and the reserve store has been replenished. The decision as to when the animals should be moved is not always an easy one but depends on the state of some indicator species.

In short, grazing must be lenient and the animals withdrawn from the paddock while there is still enough material left, so that, should there be no rainfall during the period of rest, the animals may return to the paddock for a further period of grazing. (Who knows, the American policy of "take half, leave half" may yet prove to be the most useful rule of thumb!).

Figure 1 illustrates the situation graphically. In a continuously grazed situation the grass is at the lower part of its growth curve and never gets a chance to realize its full potential. In a rotationally grazed system the grass is allowed to grow to T_2 and is only reduced to T_1. Thus grazing only occurs at a time corresponding to the steepest part of the growth curve.

Similarly we might consider two strategies (Figure 2) to compare the consequences of graze and rest cycles of varying length and severity. Rotational grazing systems which employ few subdivisions and comparatively long rest periods might lead to the situation designated Strategy 2. Here the grass is never allowed to grow at its most rapid rate and while the regrowth period is relatively long the level of prior defoliation has severely weakened the plants. In Strategy 1 on the other hand the grass is only grazed when it is growing at its maximum rate. The level of defoliation is modest and the subsequent regrowth rapid. The rest period is short and range condition could improve.

The situation depicted as Strategy 1 is in fact what has now become known as short duration grazing (SDG). It is the latest in a series of variants in multicamp grazing schemes and, in my view, the most successful. The principal proponent of the scheme (often called the Savory grazing scheme) is a Rhodesian ecological consultant, Allan Savory. The basis for his scheme is that livestock should be grouped into herds and moved across the landscape in such a manner that they:

a) select their diet very highly, being only a short time in each cell;

b) are on a unit of land for too short a time to bite plants too severely and too frequently; and

c) are off the land long enough for the individual plant grazed to recover enough to withstand another grazing.

A major feature of SDG is that the period of rest is short. There is never any prolonged rest. In practice stock are grazed on units of land from one day to 15 days and then the land is rested from 30 days to 60 days *maximum*. Full season rests (commonly advocated in some other schemes) are never used. A 'bonus' of the system (and in some cases of controlled selective grazing systems I saw in operation) is that unpalatable plants are not grazed and thus become moribund and die! By contrast, continuous grazing (or high utilization rotational grazing) leads to continual pruning of these normally unpalatable species which encourages them to tiller and increase in vigour at the expense of the palatable species.

The SDG schemes were not accepted with unanimity. Indeed from some quarters there was downright opposition from those who contended that higher stocking rates (a natural concomitant of SDG) could only result in further detriment to the land, loss of condition in cattle on it, and financial loss to the landholder.

An example of the SDG scheme that I saw in the drought-prone arid area of South-west Africa (Namibia) gave me considerable faith in the soundness of the SDG principle. The property runs about 4,500 cattle in an area with an average annual rainfall of about 250 mm. The soils are mainly granitic sandyloams. Water resources are limited and are drawn from a few bores. Under these conditions the traditional approach has been an extensive pastoral one.

The scheme was put into operation four years ago on a 'cell' that covers 1515 ha. It has only one watering point, which is located at the centre of the cell. The cell itself has been subdivided into 30 paddocks of 47 ha each, arranged in the form of a cartwheel, all fanning out from the central water point to the boundary. The herd comprised 460 cattle and in summer they graze each paddock for one or two days only before moving on to the next one. The herd therefore did a rotation of the whole cell every 30 to 60 days, and it is this rapid movement from paddock to paddock that has given rise to the term SDG. Labour requirements are minimal and control of stock easy since the cattle come down to the central watering point on a regular basis and can be easily switched from one paddock to another simply by opening and shutting gates etc. During the dormant season the rotation is relaxed and several paddocks within the cell are grazed together.

The advantages cited were:

a) encouragement of better grass species (because never is any species grazed down severely under SGD);

b) the grass seeds quite well without the need for special rest periods;

c) fences are cheaper (because the cattle are not hungry and they make no effort to force their way out of the paddock); and

d) better spread of faeces and urine.

Short duration grazing schemes have been in operation in Rhodesia for about seven years and have been established on areas ranging from mountain slopes to arid desert fringes. The success of the scheme is due, I feel, to the simulation it provides of the way in which the large herds of ungulates grazed over the land in the past. These migratory herds grazed heavily for a short period and then moved on.

We, in Australia, could benefit from the experiences of South African workers and perhaps try out some of the SDG schemes. The failure in the past in Australia of rotational grazing schemes may be due almost entirely to their failure to benefit grass growth (see Figure 2). I believe that they fell between two schools. They were not sufficiently different from continuous grazing to provide a valid contrast with it. If we are to see the benefit of rotational grazing we may need to 'go the whole hog' and try out an SDG system.

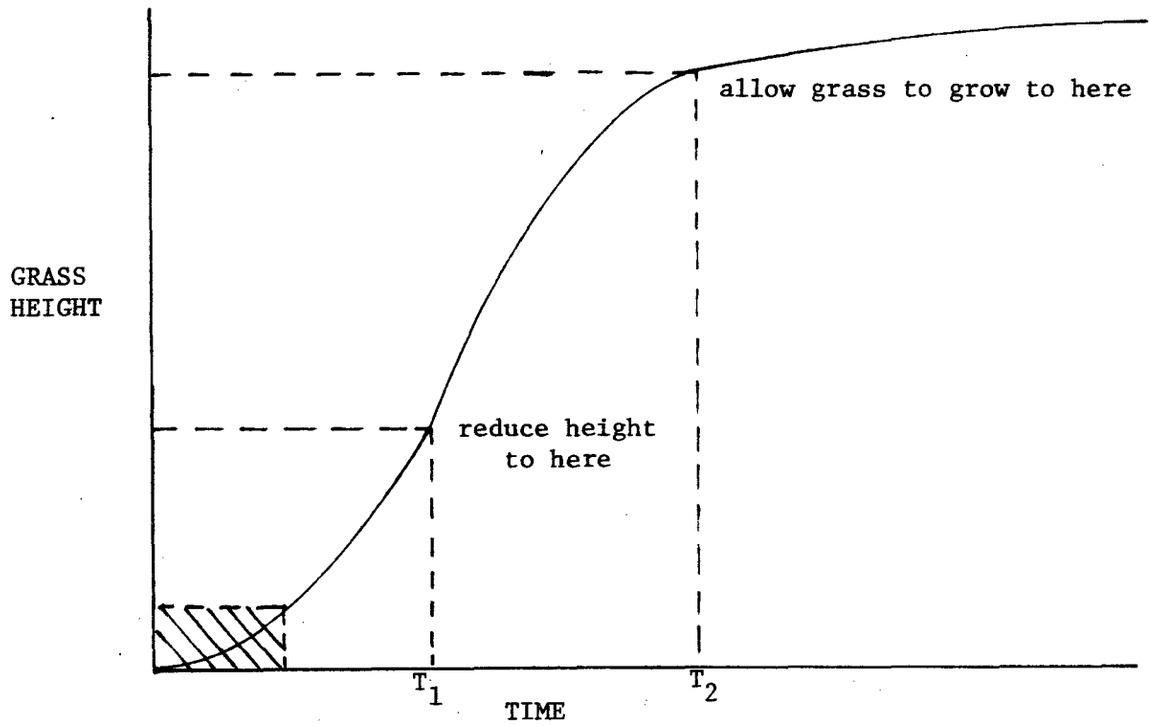

Figure 1. Comparison of effects on pasture of continuous and rotational grazing systems

Shaded area represents situation under heavy continuous grazing

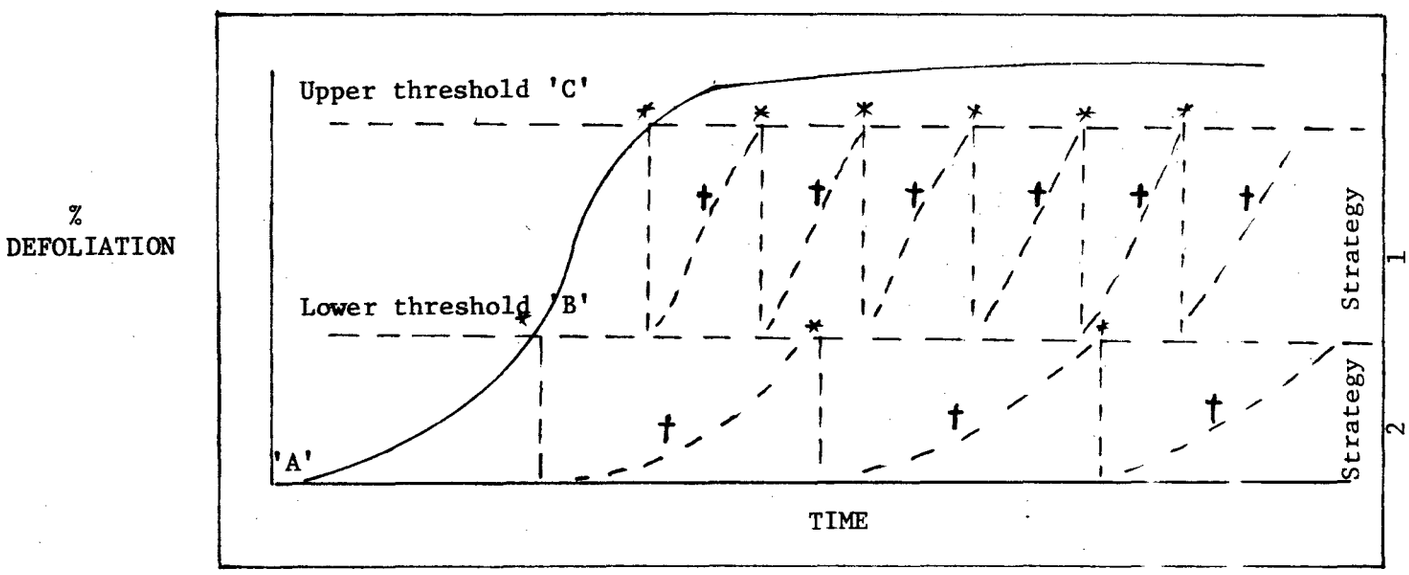

Figure 2. Comparison of the consequences of graze and rest cycles of varying length and severity

* grazed at this point
† regrowth after defoliation