# Making better use of grazing charts in rangeland grazing enterprises

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## Abstract

Data contained in grazing charts are often underutilised. We describe a simple spreadsheet program that uses these data, and a carrying capacity benchmark expressed in terms of DSE days/ha/100 mm of rainfall, to estimate future carrying capacity under specific seasonal scenarios and compare it with the planned stocking rate. Experience to date suggests that such comparisons have potential to aid management of grazing and seasonal risk in rangeland enterprises.

## Introduction

Grazing charts used by practitioners of planned grazing systems provide a record of paddock stocking rates and rainfall that can be used to assist the planning of future grazing. Typically, the charts are used to plot progressively a monthly stocking rate index, DDH/100mm (Dry Sheep Equivalent [DSE] days per ha per 100 mm of rainfall, based on rolling annual data). They also typically display the carrying capacity benchmark for the property ($DDH/100mm_{BM}$) calculated from the estimated long term carrying capacity and long term average rainfall (Bartle 2005). Hacker and Smith (2007) demonstrated that this benchmark could be used in conjunction with rolling annual rainfall totals to produce stocking rate estimates – hereafter referred to as 'short term carrying capacity' - that agreed well with 'proper' stocking rates calculated from 'safe' utilisation of simulated pasture growth, provided the rolling annual rainfall total was above the $10^{th}$ percentile. These short-term carrying capacity estimates represent a 'dynamic benchmark' against which actual stocking rate can be compared. Forward projection of these estimates should assist planning and

seasonal risk management by allowing the impact of future seasonal conditions to be assessed.

In this paper we describe a simple spreadsheet model developed to provide these projections and our experience of it to date in the planned grazing system operated by the senior author.

## The property

Bokhara Plains is a property of 7,200 ha located on the floodplains of the Bokhara River, 30 km north of Brewarrina, NSW. Average annual rainfall is 385 mm with a tendency towards summer dominance. The property has been subdivided into 100 paddocks, which are managed by means of an intensive, planned grazing system. Stock is mostly run on an agistment basis and consequently stocking rate can be readily varied as seasonal conditions dictate. The carrying capacity benchmark of the property is currently set at 55.6 DDH/100mm.

## The planned grazing system

The planned grazing system at Bokhara Plains aims to have animals present in any particular paddock at the right time, for the shortest possible time, in the right number, and for the right reason. At the paddock level, the system aims to achieve high intensity grazing for short periods with pasture utilisation and rest period for each paddock based on “recovery time” for key species.

At the property level, matching stocking rate to carrying capacity is critical and carrying capacity is assessed continuously, not just in dry periods. The long-term benchmark provides some guidance regarding appropriate animal numbers and also allows observed improvements in the productivity of the landscape to be expressed.

## Forward planning

The spreadsheet program we have developed provides a simple means of storing the monthly data produced from the grazing chart and using it to assess the impact of future seasonal conditions on the match between stocking rate and short-term carrying capacity.

The program first prompts for the number of months ahead that gazing is to be planned (up to 12 months), then for the rainfall decile expected in each month and the planned number of DSEs to be run. It then calculates the rolling annual DSE days (total and per ha) planned, and the corresponding 'expected' figures derived from the rolling annual rainfall totals and the benchmark carrying capacity (Table 1). Comparison of the planned and expected values allows an assessment of the sustainability of the planned stocking rates under the assumed seasonal scenario. Where mismatches occur the grazing can be replanned until a better match is achieved by altering either the seasonal expectations - and therefore the seasonal risk inherent in the grazing plan - or the stocking rate.

An alternative approach is to assume a 'worst case' scenario so that an early warning is provided of excessive stocking if seasonal conditions suddenly deteriorate. The process can then be repeated when the next significant rainfall event occurs, so that future stocking is always seen in the context of current conditions.

**Table 1.** Abridged example of the output of the spreadsheet for the planning period March 2010 – September 2010

| Plan month | Expected rainfall decile | Expected rolling annual rainfall (mm) | Planned DSEs | Planned rolling annual DSE days/ha | Expected rolling annual DSE days/ha |
|---|---|---|---|---|---|
| Mar | 5 | 728 | 11,000 | 549 | 405 |
| Apr | 5 | 675 | 8,000 | 553 | 375 |
| May | 5 | 630 | 2,000 | 519 | 350 |
| Jun | 5 | 616 | 2,000 | 486 | 342 |
| Jul | 5 | 625 | 0 | 435 | 347 |
| Aug | 5 | 634 | 0 | 378 | 352 |
| Sep | 5 | 614 | 0 | 323 | 342 |

This follows a period of heavy stocking with agisted cattle under excellent seasonal conditions resulting from high rainfall in the 2009-10 summer. The planning assumes that seasonal conditions will revert to 'normal' (decile 5 rainfall each month) and that stock will gradually be reduced to zero. Under this plan the annual stocking rate would exceed the

short-term carrying capacity until June after which destocking would produce a reasonable match of stock rate and carrying capacity in August and September.

Our experience with the spreadsheet to date has been limited. However, we expect that it will prove useful in planning the entry and exit of agistment stock and in negotiating these arrangements with owners and agents. It will allow grazing chart data that otherwise have limited value to contribute directly to forward planning of the grazing operation.

Because annual stocking rate may exceed short term carrying capacity for part of a planning period, as in Table 1, it is important to monitor continuously the level of utilisation of key species to ensure that these short term mismatches are not resulting in levels of use that may predispose these species to unacceptable risk if seasonal conditions unexpectedly deteriorate.

While grazing charts are most commonly used by practitioners of more intensive grazing systems the information outlined above is relevant to any grazing enterprise since in all cases the matching of stocking rate and short term carrying capacity is of fundamental importance.

## Limitations and future developments

At this stage the spreadsheet allows planning only for the whole property. Development to allow the rotation to be altered by adding or removing individual paddocks, as occurs in practice, would require entry of grazing chart data on a paddock basis, and would entail greater complexity in calculating rolling values for stocking rate and short term carrying capacity. The justification for this development is not yet clear.

As noted by Hacker and Smith (2007) calculated carrying capacities may be unreliable if the rolling annual rainfall total is below about the $10^{th}$ percentile. Under these circumstances in particular primary focus in grazing management should be on the observed utilisation of key species rather than the spreadsheet output.

## Conclusions

Grazing charts can provide information relevant to the management of any grazing system but the data they contain are often underutilised. A simple spreadsheet program used to match short-term carrying capacity under assumed seasonal scenarios with planned stocking rate has potential to improve management of grazing and seasonal risk in rangeland enterprises.

## References

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