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Pastures - carrying capacity

Fact Sheet series for the Small Rural Landholder

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A healthy, productive grazing system is an essential goal for any livestock producer regardless of enterprise size or type.

Generally, advice provided to new landholders relating to carrying capacity is often based on traditional, "best case scenario" pasture management and relies heavily on consistent high rainfall patterns and heavy fertiliser inputs.

A more realistic approach looks at different pasture class types and their respective carrying capacities and then applies these lower figures to properties, until such time as the property management is self sustaining or better, in surplus.

This ensures better environmental outcomes, more certainty for feed budgeting and potentially fewer associated costs, and better management of species-appropriate pasture management – particularly for small holdings.

Carrying capacity - the basics:

- It is important to obtain a realistic assessment of current carrying capacity and reassess regularly before making adjustments to stock numbers. This may take a couple of seasons to understand and it will pay to be conservative during this time.
- A need to ensure available grazing area estimated is accurate to avoid overestimating carrying capacity (e.g. Land size minus the area percentage of buildings, dams, garden area, other infrastructure).
- A need to find a realistic balance between targeting 'Best Practice Management' (BMP) (i.e. the potential carrying capacity if all limiting parameters are addressed) and what is achievable given the human, physical and financial resources available to improve and manage the property.

Questions to address:

- Are the costs of inputs (e.g. fertiliser) and time required for increasing the stocking rate viable?
- Do the potential returns per hectare outweigh the input costs?
- Can the returns be met whilst also achieving realistic environmental and labour saving benefits?

Feed source values

Feed on the ground is always worth more than feed stored (e.g. hay), and feed produced on farm is much more economically and environmentally advantageous than feed brought onto farm.

Consider realistic stocking rates to enable you to maintain animals year round, without having to heavily supplement them with bought in feed.

How many animals can I carry?

See Table 1 (over page) on 'Carrying Capacity' for set stocking to help you work out numbers for your property size and also for the existing conditions of your pasture.

Don't rely on the 'best practice capacity figures' or 'potential carrying capacity' until you have achieved and maintained these conditions.

Port Phillip & Westernport CMA
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Demonstrating Sustainable Farm Practices

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Table 1 shows how set stocking rates are dramatically affected by the condition of the pastures and also the types of animals being run. Cattle and horses require significantly more land than sheep to maintain them year round without supplementary feed.

Case study example:

John & Julie purchased a 10ha (24.7 acre) property and want to grow and finish store steers. Their pastures are old improved but degraded pastures on average to good soils but have had no fertiliser inputs for the past 15 years. They have been told with improved soil nutrition and grazing management they could comfortably increase their carrying capacity 50%,

Their current pasture class is estimated to be approximately 10 DSE/ha. Assuming they have use of the full 10ha for grazing, they can maintain one steer per hectare (or a total of 10 steers) without doing anything more to the pastures.

The most productive and sustainable system of grazing management is rotational grazing. Rotational grazing works on the principle of a short intensive period of grazing followed by an extended period for the pasture to recover. A simple example could be a five paddock rotation with one weeks grazing followed by four weeks for regrowth.

Animal	DSE*	Pasture class DSE/ha (examples only)	Pasture type/condition corresponding to pasture class (examples only)	Number of animals able to be maintained on 1ha year round	Total area (ha) required to maintain a single animal year round	Total area (acres) required to maintain a single animal year round
Store sheep*	1.0	3	Native/unimproved 'old style' pastures, overgrazed pastures	3	0.3	0.74
Store steer	10			0.3	3	7.4
Cow	13			0.23	4.3	10.6
Horse	10-18.7			0.16-0.3	4.3-6.2	10.6-15.3
Store sheep*	1.0	6	Improved native and mixed introduced/native pastures	6	0.16	0.39
Store steer	10			0.6	1.6	3.9
Cow	13			0.46	2.1	5.2
Horse	10-18.7			0.32-0.6	1.6-3.1	3.9-7.6
Store sheep*	1.0	10	Improved pastures including legumes on poor soils	10	0.1	0.2
Store steer	10			1	1	2
Cow	13			0.76	1.3	3.2
Horse	10-18.7			0.53-1	1-1.87	2.47-4.6
Store sheep*	1.0	15	Improved pastures including legumes, good soils	15	0.06	0.14
Store steer	10			1.5	0.6	1.4
Cow	13			1.15	0.86	2.1
Horse	10-18.7			0.8-1.5	0.6-1.25	1.5-3
Store sheep*	1.0	20	Improved pastures including legumes, good soils, fertiliser program	20	0.05	0.1
Store steer	10			2	0.5	1.2
Cow	13			1.5	0.65	1.6
Horse	10-18.7			1-2	0.5-0.9	1.2-2.2

*45kg dry merino ewe/wether at maintenance

NB: One hectare (1ha) equals 2.47 acres

Source: Russell, A. (2010) 'Using DSE's and carrying capacities to compare sheep enterprises', DPI NSW

Table 1: An example of pasture classes/condition and number of animals to be set stocked

The rotation, 'cell grazing' or 'wild animal model' system

Popular with permaculture farming, this has many benefits from both a welfare and environmental perspective.

This method can potentially increase stocking rates significantly without having to wait to improve the soil fertility first. As an added bonus, it can actually help to improve soil fertility by utilising the large amounts of manure left in each paddock at a time as well as larger stock numbers disturbing the top layer of soil and stimulating macro and micro biological activity.

The ability to move larger numbers of animals over smaller areas of pasture for a shorter period of time (ideally aim for moving the herd onto new pasture every few days) is described in Figure 1 above right. This is similar to strip grazing management with temporary electric fencing used by dairy farmers to maximise pasture production.

Benefits of cell grazing

A more 'natural' regeneration pattern for pastures and a longer period of recovery and rest mean more vigorous pastures, better soil conditions and fewer parasites to survive a full life cycle.

Keeping larger groups of herd animals together reduces stress, replicates the 'wild animal model' on the environment and makes containing and moving animals easier as they are already in one place.

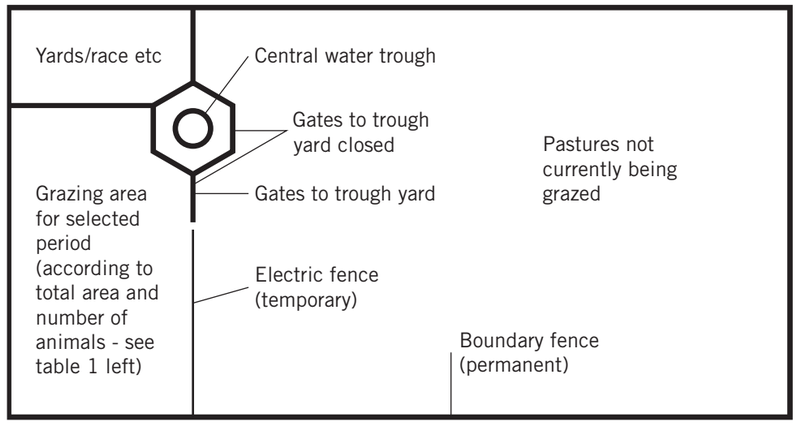

Figure 1: An example of rotational or cell grazing model with permanent structures

Adaption of this management strategy

If John & Julie adapted their property to a cell grazing model along with fertiliser inputs based on soil tests, they could reasonably expect to increase their stocking rate up to1.5 steers per hectare, or running 15 steers on their 10ha without having to outlay a significant financial investment in whole property improvement. Further experience in pasture and livestock production may lead to incremental increases in carrying capacity but on smaller properties a couple of extra head in a drier year can quickly result in overstocking.

With a system of 12 grazing areas, each would be ideally grazed for 3 days only, leaving a 33 day rest period for each paddock. This is assuming moderate pastures at 10cm height during the colder months, and that John& Julie would be systematically improving their soil fertility one section at a time.

Benefits of a cell grazing system

This system is easy to set up and maintain. It eases wear and tear on permanent fencing and infrastructure, because animals always have access to new pastures and are less likely to wander.

Additionally, you may wish to utilise existing infrastructure such as yards and water troughs as a central 'base', whereby the animals must visit periodically to drink. This makes checking over them and supplementary feeding a much easier task.

Another alternative, which works with temporary fencing, is a portable water and trough system. For example a 1000L water tank on a trailer with a portable trough underneath, moved with each paddock rotation. This strategy helps to reduce compaction and heavy wear from stock camps around permanent troughs and gate ways.

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Relevant resources

Meat & Livestock Australia has a range of Tips & Tools to help decision making. Topics include:

- Pasture utilisation and carrying capacity
- Tactical grazing to maximise pasture and animal productivity
- Improved pasture management
- Grazing management considerations

www.mla.com.au/Research-and-development/Grazing-pasture-management

- Pasture Tools and Calculators
- Animal Health and Nutrition Calculators
- Feed Calculators
- Cost of Production Calculators

www.mla.com.au/Extension-training-tools/Tools-calculators

Example of a Strip grazing sequence (clockwise from above)

1. Animals are moved onto new pasture approximately 10cm in height with moderate density and low variety

2. The pasture after having been grazed for approximately 7 days (three 500kg horses and one 300kg pony), area of around 2000sqm. Pasture is now approximately 5cm in height and less dense, evenly grazed and heavily manured.

3. Previously grazed pasture after approximately 20 days of rest (winter time). Height is back to around 10cm, however density is still lower than pre-grazed pasture, indicating more time is required for recovery for grazing.

4. A manure pile from the pasture in picture 3 – note the new growth coming through and around the manure. Very little breakdown of the manure pile indicates more time is required before stock can be allowed to graze here again. Harrowing can speed up the break down process, but is still more effective in dry, warm conditions.

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