Dealing with sown pasture run-down

Symptoms, causes and management

Have you noticed:

- Your buffel grass is not growing as big and bulky as it used to?
- Your buffel grass pale green or yellow in colour instead of being dark green, especially after rainfall?
- Your green panic found only growing underneath large trees?
- Your grass tussocks smaller, with few or no seed heads?
- Other grasses now present in what were pure sown grass pastures?

If you answered yes to more than one of these questions, it's likely your pasture is suffering from nutrient tie-up—also known as run-down—and is not growing as much feed as it could.

Sown pasture run-down is the decline in pasture production over time. Sown pasture grasses are initially very productive when planted after clearing or in fertile cropping soils. However, their productivity typically declines over time.

Symptoms

- Reduced pasture growth
- Yellowing or reddening of leaves (nutrient deficiency)
- Changes in pasture density
- Few or no seed heads present
- Changes to pasture species mix or composition
- Reduced animal performance and live-weight gain

Pasture productivity decline is not caused by a net loss of nutrients from the soil, but rather from the tying up of nitrogen (N) in soil organic matter, crowns, roots and litter of old grasses in forms that are unavailable to plants. The largest pool of N under pastures is in soil organic matter.

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Figure 1: Run-down buffel showing a blanket of small, yellowing tussocks with poor growth and no seed heads

Figure 2: Run-down buffel grass showing change in colour, production and seed heads following N application

Figure 3: Renovated buffel versus run-down buffel (note the difference in colour, growth and seed production). Photo courtesy of Shaun Salter 'Gaybrielle Downs', Teelbah.

Causes

Pasture run-down is caused by a lack of available nutrients, mainly N. It is not caused by a net loss of nutrients from the system. During the period when land is fallowed, either after clearing native vegetation or after a crop is harvested, high levels of available N accumulate before pasture is planted. This causes very high productivity and dark-green newly established grasses.

The high intake of available N by sown grasses, coupled with a lower rate of N cycled back into the system in a plant-available form over time (i.e. through organic matter breaking down), reduces grass production. In short, the demand for N is greater than the supply.

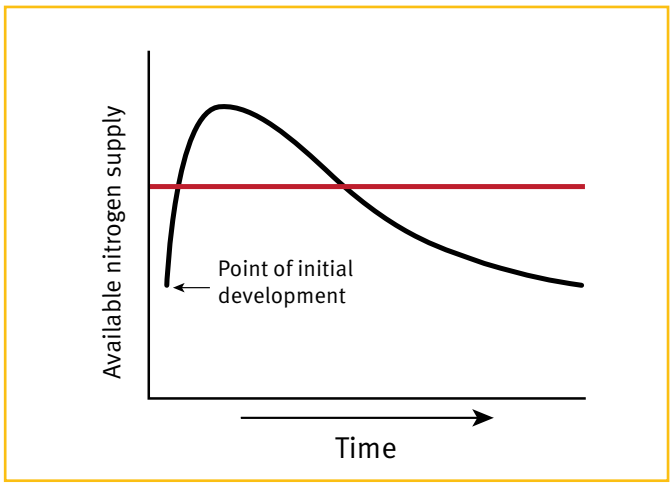
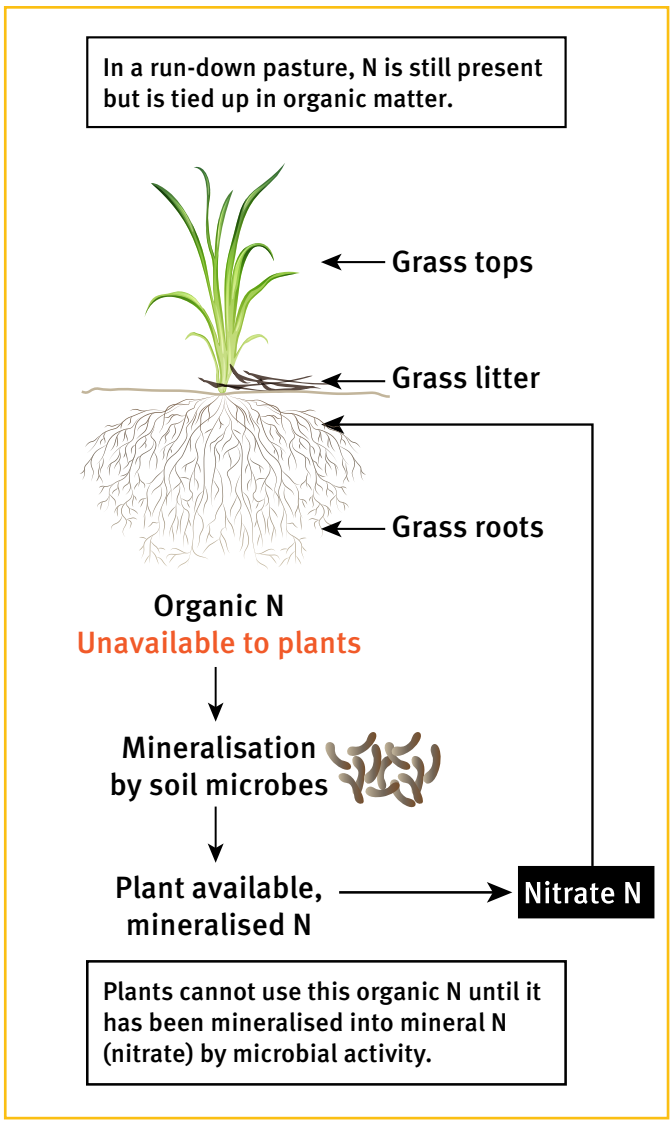


Figure 4: Grass productivity over time from initial development until N run-down—the red line shows the constant level of N needed by a sown pasture to maintain optimal growth



Sown pasture run-down vs declining land condition

Pasture productivity decline is not only due to nutrient rundown. It can be the result of a number of factors such as stocking rate not being matched to carrying capacity leading to declining land condition as a result of grazing management, or a consecutive run of poor seasons over many years. Sown pasture run-down is often confused with declining land condition, and although the symptoms and outcomes are similar, the causes and management of the two are quite different.

Table 1: Difference between pasture run-down and declining land condition

	Pasture run-down	Declining land condition
Definition	Sown pasture run-down is the decline in pasture production over time.	Land condition is a measure of the health of grazing lands, and their ability to respond to rainfall to produce useful forage.
Causes	Pasture run-down is caused by a lack of plant-available soil N for pasture, growth as nutrients become tied up in the crowns, roots and organic matter of old grasses.	A decline in land condition is often associated with overgrazing through a failure to match stocking rate to carrying capacity, leading to loss of desirable pasture species, soil degradation (low ground cover and erosion) and a reduced capacity for the land to capture and respond to rain (less infiltration and more run-off).
Assessment and measurement	Indicators of pasture run-down include: • grass production (height, tussock size and biomass) • grass colour • presence of seed heads • species diversity • animal performance.	Land condition is assessed on the ability of the landscape to respond to rain and produce useful forage. Three components are measured: 1. soil condition (ground cover, evidence of erosion) 2. pasture condition (presence of preferred grasses) 3. woodland condition (amount of trees and regrowth) Nutrient availability is not measured.
Management	Accept lower pasture production, increase N cycling and increase N inputs	Improve grazing management by matching stocking rate to carrying capacity

For more information on land condition, visit **www.futurebeef.com.au**.

Run-down has reduced grass growth by up to 50% across large areas of sown pastures, with flow-on effects reflected in similar losses in carrying capacity and weight gains.

Managing run-down

To improve production, there must be greater inputs of plant-available (mineral) N, which can accrue from:

- pasture legumes that fix N in the soil (moderate N inputs)
- N fertiliser (N inputs depend on the amount applied)
- cultivation or short-term fallows (small to large N inputs)
- other symbiotic N fixation from things such as lichens and rhizosphere endophytes, or free-living bacteria (very small N inputs)
- rainfall (very small N inputs).

There are three management strategies that can alleviate the impacts of run-down.

1. Increase nitrogen inputs

There are two options for increasing N levels—adding fertiliser or adding a legume to the pasture. For more information, refer to fact sheet 2, *Dealing with sown pasture run-down: increasing nitrogen inputs*.

2. Increase nitrogen cycling

Management options that increase N cycling promote the release of unavailable N in organic matter into forms available for plants to use. This can be achieved mechanically (i.e. by cultivation) or via crop and pasture rotations. For more information, refer to fact sheet 3, *Dealing with sown pasture run-down: increasing nitrogen cycling*.

3. Accept lower pasture production

Accepting lower pasture production is not recommended as a sensible management strategy for dealing with sown pasture rundown. However reducing stocking rates to maintain individual animal performance and land condition is the most commonly used management strategy. This is often not a conscious decision, but rather the end result of managing seasonal variability (i.e. droughts), achieving poor results from other management options, lack of knowledge about other management options or cost constraints.

While good grazing management to maintain land condition can maximise rainfall capture, it will not stop N tie-up (run-down) from occurring. The more forage that grows, the more N becomes tied-up and unavailable to the grass. Even in good seasons, pastures that have been established for several years and managed for good land condition will suffer reduced production because available N is limited.

Management options for accepting lower pasture production and improving productivity include:

- reducing stocking rates
- changing grazing systems (e.g. to improve land condition)
- managing other grass species that are more tolerant of low N availability
- supplementing stock to improve diet quality
- developing another paddock
- buying more land
- investing in other aspects of the business (e.g. water, genetics, fences, off-farm).

More information

This fact sheet is the first in a series of three fact sheets about sown pasture run-down. For more information on other management options, refer to:

- **fact sheet 2**—*Dealing with sown pasture run-down: increasing nitrogen inputs*
- **fact sheet 3**—*Dealing with sown pasture run-down: increasing nitrogen cycling.*

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