

Managing pastures after drought

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INTRODUCTION

It is vitally important to quickly rebuild the state's stock numbers and improve each producer's earning capacity as quickly as possible after a period of drought. For this reason, the potential from our pastures must be realised as soon as possible. This Primefact considers the effects of drought on our pasture base and discusses aspects that need to be considered in decision making when we come out of drought.

EFFECTS OF DROUGHT ON PASTURES

The effects of drought on pastures are extremely variable and subject to a large number of factors.

Research results and observations based on past droughts are outlined below. The current drought has been particularly severe in many areas, and loss of species may be greater than losses experienced in previous droughts when these observations were made.

PERENNIAL PASTURES

Large areas of perennial pastures will have thinned out, depending on the severity of drought, stock pressure, the species involved and soil fertility.

Research on drought survival of species

Recent research undertaken in the Northern Tablelands by the University of New England and CSIRO looked at survival of perennial grasses during drought. It showed the following:

- Where stubble was retained (>1000 kg of dry matter per hectare), the survival of perennial grasses was significantly better than where feed was grazed out completely.

- Losses following prolonged dry conditions (where some green feed may be available) were greater than losses from the severe droughts such as those experienced say 1 year in 10. Researchers concluded that in longer-term droughts, plants are more likely to cease growth, whereas in prolonged dry spells plants continue to grow and the feed is grazed off, gradually debilitating the plants' energy reserves, resulting in death of the plants or very weak plants.
- Under tableland conditions and on good-fertility soil, the shallower rooted species such as perennial ryegrass and cocksfoot were lost in significant numbers in this trial, whereas phalaris, fescue, and the native grasses wallaby grass (*Austrodanthonia richardsonii*) and weeping rice grass (*Microlaena stipoides*), survived.

Each drought is different, with the current drought being exceptionally severe in many areas. When looking at what is likely to have survived the drought and what may need to be resown, we can be guided by these research results and by observations of survival of the major pasture species in previous droughts, as indicated below.

Introduced temperate perennial grasses

- **Phalaris.** Experience has shown that of the introduced major perennial grasses, phalaris has been the outstanding survivor, followed by cocksfoot, fescue and then ryegrass. Provided fertility is good, and particularly on the heavier soil types, phalaris has persisted well, even under heavy, prolonged grazing pressure. The more erect varieties, typified by Siroso and Sirolan, have been less persistent than the old prostrate Australian variety.
- **Tall fescue.** The combined effect of dry, hot summer and heavy stocking, particularly with sheep, caused a widespread failure of fescue. This was more apparent in areas receiving less than 650 mm rainfall (Northern Tablelands) and 750 mm (Southern–Central Tablelands). These experiences serve to emphasise the need to exercise more careful grazing management of



fescue-based pastures, especially under a sheep enterprise during summer, and to employ some form of rotational grazing to reduce stress on individual plants.

- **Cocksfoot and ryegrass.** These species have exhibited poorer survival compared with phalaris and, in many situations, compared with fescue, although survival has been better on heavier soils and where pastures were stocked with cattle rather than sheep. Mediterranean cocksfoots (like Currie) have survived better than European types, although cocksfoot failed eventually under the combined effect of drought and consistent heavy stocking pressure, with most perennial ryegrass dying before cocksfoot. In some situations, regeneration of ryegrass and cocksfoot from soil seed reserves was surprisingly good in the higher-rainfall areas (>800 mm) following the drought of the early 1980s.

Introduced temperate perennial legumes

- **Lucerne.** Lucerne also has a good track record, but this depends on the intensity of grazing pressure during the drought. Semi-dormant and selected winter active varieties would be expected to survive better than highly winter active varieties, unless strict rotational grazing has been practised.
- **White clover.** Shallow-rooted perennial legumes such as white clover generally do not survive as perennial plants, although varieties such as Haifa have good potential to recover from soil seed reserves, assuming that the pasture has been well established and had a good opportunity to set adequate seed.
- **Subtropical grasses.** Of the more commonly grown grasses, Bambatsi panic, Premier digit grass, Consol lovegrass, Forest bluegrass and Buffel grass have survived better than Purple pigeon grass or Rhodes grass in recent droughts.
- **Native perennial grasses.** Experience has shown that native perennial grasses survive well, although the pressure on some paddocks has been so extreme in some areas that losses have inevitably occurred. Survival and the potential for quick regeneration from seed is very dependent on the species of grass involved and management applied, and on recruitment opportunities.

ANNUAL PASTURES

Well-established introduced annual pastures have the advantage of generally good soil seed reserves and the ability to respond rapidly when conditions

allow. However, annual pasture paddocks have the disadvantage of having very little ground cover left and may be very prone to erosion. Seed reserves may be depleted in heavily grazed sheep pastures, but in long-term pastures, there is normally adequate seed left to enable reasonable regeneration to occur.

In recently sown pastures, especially if sown with relatively soft-seeded varieties of sub clover (e.g. Woogenellup, Denmark), resowing may be necessary.

EFFECTS OF DROUGHT ON SOIL FERTILITY

While individual soils react differently to weather changes, there are some general principles that can help when coming out of a prolonged drought:

- Nitrogen (N), phosphorus (P) and sulfur (S) are major nutrients required for plant growth and tend to be at slightly higher levels in soils after drought than before. These higher levels will assist production in the short term (3–4 months), but where pre-drought levels were markedly deficient, growth will still be checked by nutrient deficiency.
- P and S fertilisers applied just prior to the drought can be assumed to be still available, although if resowing pastures, a small amount (e.g. 5 kg P/ha) should be sown with the seed.
- Where improved pastures were maintained at critical levels of P and S pre-drought, fertilising could be withheld for perhaps 6 months, unless a soil test indicates otherwise.
- If you are not sure of specific paddock fertiliser needs, do a soil test or apply fertiliser strips.
- The drought is unlikely to have any significant long-term effects on soil pH.

FIRST, ASSESS WHAT HAS SURVIVED

Before working out a strategy, consider the needs of the pasture and how the drought has affected it. The survival of both perennial grasses and legumes will have been variable and influenced by:

- total rainfall, and rainfall incidence
- pasture composition
- soil type, slope and aspect
- type of stock and stocking rate
- grazing management
- pasture pests, e.g. wingless grasshoppers, pasture scarabs, lucerne aphids and earth mites
- health of pastures before the drought.

The first task is then to check paddocks after growth has recommenced, ascertain what is left, and determine what the potential of the remaining pasture is, given a reasonable chance of recovery and reasonable seasonal conditions. For annuals you may have to wait until spring (for warm-season annuals) or autumn (for cool-season annuals).

If you need help to determine what species are regenerating, seek advice from your district agronomist, consultant or commercial representative. When checking the pastures, keep in mind that the density of perennial species is more important than that of annual species.

DENSITY OF SURVIVING PASTURE

How dense a pasture should be in order for it to be retained depends on many factors and will vary from district to district. For example, at Wagga Wagga or Tamworth, lucerne densities of 15 plants/m² are relatively thick, but 9 plants/m² would be acceptable; however, at Trangie, 8 plants/m² is thick and, say, 5–6 plants/m² acceptable.

Remember that the remaining perennial plants in a drought-affected pasture (especially lucerne) have the ability to compensate, so that as stands thin out, remaining plants take advantage of the additional space, nutrients, moisture etc. and may still produce reasonable yields.

EROSION POTENTIAL

The erosion potential of all paddocks needs assessing as well. Adequate ground cover is the key. This will vary with the situation (slope, soil, likely rainfall intensity etc.); for example, 70% ground cover is considered as the minimum for gently sloping red soils on the northern and central slopes.

VALUE OF SURVIVING PASTURE

Consider also the composition of the surviving pasture in relation to its value to the enterprise following the drought. Perennial pastures are very expensive to resow, and native grass pastures in most cases can't readily be resown. These high-value pastures must then be given priority for rest if it is apparent that further grazing may threaten their survival.

After checking the potential of pastures for survival and for future production, rank your pastures according to their potential value after the drought, as follows:

A. List paddocks that have a moderate to good density of desirable species but have been under severe stress from drought and grazing pressure. Maintaining a grazing regime that continually removes regrowth is likely to threaten survival further.

- B. List paddocks that have moderate to good density of desirable species but have not been under severe stress from drought and heavy grazing. These paddocks offer the possibility of some grazing as conditions improve but will need management to allow full recovery in the short term.
- C. List paddocks where the pasture density is too thin in order for it to become worthwhile pasture after a return to more normal conditions. This last group can be considered for immediate grazing (sacrifice paddocks), cropping possibilities, resowing or pasture renovation treatment.

HOW TO MANAGE WHAT'S LEFT

In practice, pastures are under a great deal of pressure after the drought breaks. Feed is expensive, and it is tempting to continue grazing paddocks in the hope that the growth will improve dramatically and gradually meet stock needs. This is very damaging to pastures. It is important to develop a strategy where:

- the high-potential paddocks, identified as A above, are given priority for rest;
- the second group, B, are scheduled for rest as soon as practicable;
- paddocks in the last group, C, can be used as sacrifice paddocks where drought feeding can continue until growth on better paddocks improves; importantly, these paddocks are suitable for resowing, renovation or being sown down to forage/fodder crops.

'Ideal' post-drought management procedures are not well understood for many of our commonly used species, so we can only base guidelines on limited research and observations made following previous droughts.

During drought, pasture management is compromised:

- Pastures are rested less (if at all).
- Pastures are grazed harder for longer periods and are grazed to a height that is shorter than normal.
- Energy reserves are depleted and the plant is weakened, often to the point of death.

Where pastures are compromised in this fashion, they need to be compensated. A good fall of rain in itself does not overcome drought stress. The plant has to be allowed a period of recovery to build up energy reserves so that it is capable of reaching its full potential production. The time required to reach

this stage depends very much on the degree of rest or compensation.

Lucerne is particularly responsive to resting. Ideally, after drought, it should be allowed to reach full flower, at which stage, with good growing conditions, it will have replenished its root reserves fully, and normal grazing practice can continue. Research has shown that energy reserves in the lucerne roots are at their lowest 2 weeks after regrowth commences. Grazing the 'green pick' shortly after rain can therefore weaken the plant significantly. The more growth allowed before grazing, the better chance the plants have for a complete recovery.

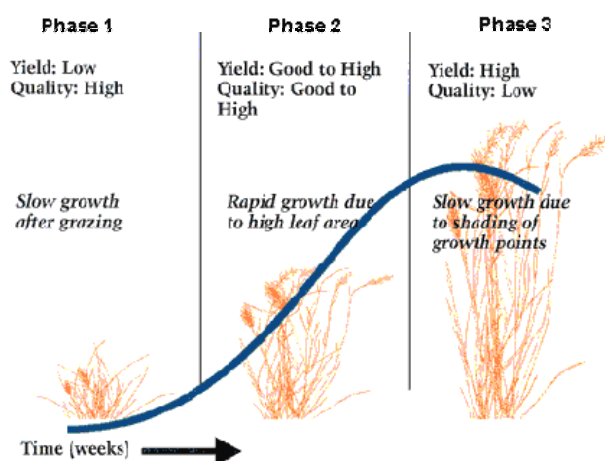
WHEN TO GRAZE

The simplified growth curve shown in Figure 1 can be used to indicate when pastures should normally be grazed. Avoid grazing pastures while the important perennial components are in phase 1. At this stage they are weak and have insufficient leaf area to produce feed quickly. Ideally, pastures should be allowed to reach phase 3 and reach flowering after such a long, severe stress period. At this stage, the plant's energy reserves have been replenished, assuming flowering has not been premature (i.e. forced by dry conditions).

At the very least, after drought, delay grazing until pastures are into phase 2, at which stage they are growing actively and have sufficient leaf area to produce feed efficiently. Where you are forced to graze paddocks early, plan to rest them (and preferably allow perennial grasses to seed down) as soon as conditions permit. Rotate livestock quickly.

The height of pasture at these growth stages will vary considerably, depending on species, density, growing conditions etc., but as a guide, a typical healthy dense perennial grass/legume pasture would be in phase 2, between 3 cm and 11 cm high (1000–2500 kg dry matter/ha). It may take 4–6 weeks to reach this stage, assuming responsive plants are present.

Figure 1. Simplified growth curve of pastures



Source: The PROGRAZE Manual

RESOWING / CROPPING / RENOVATION OPTIONS

Where paddocks are identified as having low recovery potential, resowing, cropping or renovation are options that need to be considered. Such options include a full seed-bed preparation for a forage crop or cash crop, or direct drilling to re-establish a permanent pasture, while some annuals such as sub clover can be surface-applied in higher-rainfall areas.

Table 1 summarises the options for typical paddock situations following the break of the drought:

Table 1: Options for pasture renovation

Paddock situation	Options
Totally degraded. Substantial loss of introduced perennial grasses. Heavy weed invasion.	<ul style="list-style-type: none"> Annual forage crop (e.g. Japanese millet, cereal etc.). Short-term pasture (e.g. Italian ryegrass / red clover etc.). Cash crop (e.g. cereals, oilseeds, ryegrass, coarse grains to allow selective weed control). Select the most arable and fertile paddocks first. High priority.
Partial loss of introduced perennials. Some weed invasion. Reasonable legume recovery likely.	<ul style="list-style-type: none"> Weed control and direct drill to re-establish perennial pastures. Seasonal weed control (e.g. winter clean spray-graze). Moderate priority.
Survival of perennials >70%. Poor legume survival. Some weed invasion.	<ul style="list-style-type: none"> Reintroduce legume by sod-seeding or broadcasting. Resume fertiliser applications to lift P and S, or when cash flow allows. Selective broadleaf weed or annual grass removal, or use of 'weed wiper' equipment. Moderate priority.
Fair to good survival of native perennial grasses. Poor legume survival. Some weed invasion.	<ul style="list-style-type: none"> Low priority for early action. Add legume seed and P and S fertiliser when cash flow improves.

FORAGE CROP SELECTION

Fast-growing forage crops fit in well to a pasture regeneration program after drought. Once established, they can take the pressure off the high-potential pastures, allowing them to recover. They also are useful for cleaning paddocks of weeds prior to resowing pasture, and for replenishing hay and fodder reserves quickly.

The most suitable forage crop will depend on:

- when feed is required
- what quality of feed is needed
- sowing conditions including soil temperatures
- suitability of the soil type.

Often after a drought, feed is required as soon as possible, and Japanese millet or early-maturing cereals are preferred.

Where crops are required to provide feed over a longer period, forage sorghums or hybrid millets have a place on the slopes and plains, as have brassica forages on the tablelands.

STOCK HEALTH

With good growing conditions, watch for bloat in stock grazing clover-dominant pastures, and ensure that livestock vaccinations, e.g. for enterotoxaemia, are up to date. Also, stock grazing on actively growing lucerne need close monitoring, as lucerne growth can be rapid after the drought, increasing the risk of the occurrence of bloat and red gut.

Following drought, the 'sudden death' form of phalaris poisoning can occur, especially where pastures are growing rapidly following the break. This is because phalaris is more persistent than other grass species and can dominate. This form of phalaris poisoning is associated with short, actively growing phalaris-dominant pastures in autumn or late winter–spring, and is more prevalent where hungry sheep are involved.

Similarly, other pasture plants may dominate during the recovery period, and intake of plant toxins may form an unusually high proportion of the diet, and therefore be a cause for concern (e.g. photosensitisation with panic grass species).

Nitrate poisoning can also occur, as grass on high-fertility soils grows quickly following a break. Improved grasses, cereals and broadleaved weeds, such as variegated thistles, have caused poisoning in the past.

The incidence of worm and fluke problems can also increase because stock concentrate on new fresh growth in areas such as valley floors following the break in the drought.

WEEDS — EXTRA CARE NEEDED

One of the unfortunate consequences of droughts is the spread of new and existing weeds into pastures — dramatic spread occurred following the 1982 drought. The current drought is no different. Seeds are introduced through bought-in feed and stock movement.

Following the break, pastures are weakened and less able to compete with vigorous weeds, especially annual species. Be prepared for several years of vigilance. Do not delay checking the identification of any strange weeds you find, especially if they are found where you may have fed out fodder.

FODDER CONSERVATION

While we are continuing to experience drought conditions, it is important to build into your long-range programs a 'fodder conservation' strategy to reduce the effects of the next drought.

Silage and hay can be made from a wide range of pasture and crop materials.

CAUTION

LIVESTOCK HEALTH DISORDERS

Pasture improvement may be associated with an increase in the incidence of certain livestock health disorders. Livestock and production losses from some disorders are possible. Management may need to be modified to minimise risk. Consult your veterinarian or adviser when planning pasture improvement.

USEFUL REFERENCES

Forage sorghum and millet (Agfact P2.5.41)

Cereals for grazing (Agnote DPI-367)

Summer legume forage crops: Cowpeas, lablab, soybeans (Agfact P4.2.16)

These publications are available at:

www.agric.nsw.gov.au/reader/forage-fodder

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