DROUGHT RECOVERY

FARMERS ARE currently facing a number of issues as a result of drought – they may have lower than usual feed covers; low amounts of standing rough feed; low reserves of supplementary feed (and high cost to replenish reserves); lower than normal stock condition; and, in some cases, some unfinished stock. There will be significant downstream costs from the drought unless the right responses and actions are taken. Farmers will have to make difficult decisions that will influence their ability to manage their current situation and future production.

There are a range of management solutions available. This leaflet outlines some of the options for farmers planning drought recovery, based on research and modelling work commissioned by the Ministry of Agriculture and Forestry (MAF).

REPAIRING PASTURE DAMAGED BY DROUGHT

WHERE TO START?

To make good decisions, it is important to have good information.

The first step at the end of the drought is to assess the state of all your pastures and the likelihood of them recovering. Assess the density of the sown grass(es) and whether these plants are large/strong or small/weak. Match the degree of damage with the potential each paddock has to contribute to the overall farm production and rank them in order of priority (for example, badly damaged pasture on flats with good soil will have a high priority).

The next step is to work out a plan of attack for the next 1–2 years, including details on which paddocks to start with, what crop or pasture to sow in them and when, and the costs involved. It helps to involve all family and staff when making this plan and to seek advice from a seed retailer with good pasture and crop experience. In some cases, banks will also be interested in your plan of action.

WHAT ARE THE OPTIONS?

Where the grass and clover has thinned drastically and is not yet replaced by weeds, it is an option to drill grass straight into the paddock to fill these bare gaps without the need for herbicide application (*"under sowing"*). This works best for sowing Italian or other short-term ryegrasses. For sowing a perennial grass, experience through previous droughts has shown that there is almost always an advantage to spray the old pasture before drilling (*"spray-drilling"*). This reduces the invasion of weeds in the replacement pasture.

For many pastures, it is not ideal to try to re-establish a perennial pasture immediately. If there has been an increase in hard-to-kill weeds and weed seed during the drought, this can swamp the new pastures. Pastures that are likely to have a lot of weed and undesirable grasses should go through a crop or short-term grass phase before being planted in perennial pasture (see Table 1). An advantage of these crops is that they usually generate more feed in the short-term than perennial pastures. This is important following a drought because of lower pasture growth and low supplementary feed reserves.

TABLE 1: SUMMARY OF BREAK-CROP OPTIONS WHEN REPAIRING DROUGHT-DAMAGED PASTURE

STATE OF DAMAGED PASTURE	SUITABLE OPTIONS
1. Mostly bare ground with no weeds present.	Under sow with Italian ryegrass, or perennial ryegrass/clover.
2. Mostly bare ground with some weeds likely to re-establish.	Spray and direct-drill with short-term or perennial pasture.
3. Most productive plants have gone and are replaced by weeds.	Spray/cultivate and plant in 1–2 crops, or short-term pasture, before planting to perennial pasture.

WHAT CROPS CAN BE GROWN?

There are a number of crop types that can be planted in spring following a drought. With the current demand for animal and human feeds, there are several profitable options for cash crops as well as feed crops utilised on the farm (see Table 2). However, the area of grain crop that can be grown on livestock farms may be limited by on-farm grain storage facilities, or harvesting infrastructure.

WHAT PERENNIAL PASTURES TO PLANT?

A perennial pasture can be planted successfully after 1–2 crops, either in the spring or autumn, depending on when the final crop is harvested. Most farmers will plant perennial ryegrass and clover pastures. As a guide for what will be most sustainable on their farm, they should make notes on what types of ryegrass and which endophytes have survived best during this drought.

Many farmers would now be aware of the costs of having pastures that do not survive drought and will be looking for an alternative to ryegrass. Tall fescue is the drought-tolerant grass most similar to ryegrass for growth and quality. Other options include cocksfoot, pasture brome, lucerne, chicory, plantain and sub-clover.

HILL COUNTRY?

The options are more limited on country that cannot be cultivated or drilled. For farms that have both hill country and arable land, the arable land should be fully repaired first because the costs and failure rates on hills are often higher.

A lower cost option for hills is to spray for broadleaf weeds (for example, thistles) to prevent their spread and further loss of pasture production. If the area is to be re-established with grasses, this is best done in late autumn in the North Island and in spring in the South Island. Badly damaged pastures that are to be over sown the next autumn can be sprayed with glyphosate before November, and again in autumn 5–7 days before over sowing. This will improve establishment success. Another alternative is to over sow just clover seed in early spring (often following a thistle spray) to get the nitrogen cycle going again and thereby encouraging the regeneration of ryegrass from surviving plants and buried seed. Coated seed is recommended for its better ballistic qualities and the soil-seed contact it gives.

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DROUGHT RECOVERY REQUIRES POSITIVE ACTION ON HILL COUNTRY

AS AUTUMN merges into winter, the effects of the receding drought are not likely to ease on many farms. Recovery from feed deficits will last well into the coming spring, if not the whole season.

The Ministry of Agriculture and Forestry (MAF) commissioned AgResearch to conduct some predictive modelling work to get better indications on the outcomes of several approaches farmers are taking or can take even from this point.

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In summary, the modelling work shows that the best options in terms of least cost (average gross margin for 2007–2009 relative to two non drought years) for restoring winter feed deficit were:

- Sell off finishing stock as store animals (92%);
- Use autumn nitrogen fertilizer (91%);
- Sell all ewe lambs and/or non mated ewe hoggets and then re-buy in January (89%);
- Sell ewes and re-buy in January (87%);
- Put in winter grass crop (only partial solution) (86%);
- Do nothing (85%);
- Buy inexpensive (25c/kgDM for silage, 35c/kg DM palm kernel) supplements (70%).

The modelling work confirms that those who were able to unload finishing and cull stock early to reduce feed demands, also reduced feed deficits and are now in a much better position.

However, the work also confirms that dropping capital stock appreciably, and especially breeding ewes and ewe lambs, could ultimately be very counter-productive. One reason for this is the likely inability to control feed in the spring, especially on truly hill country farms, which will lead to waste and lowered stock performance.

Reduced stock numbers will obviously reduce income and the costs of re-stocking are likely to be high as many buyers compete in the capital stock markets. Exceptions to this will be on farms where it will be possible to take out significant areas for conservation or cropping.

The costs associated with dropping capital stock are not as great as doing nothing. This approach produces further losses in liveweight and impedes the pastures ability to grow. The drop in liveweight also increases losses and reduces performance. Stock must also recoup this liveweight at a later time. Even worse economically than doing nothing, is purchasing expensive supplementary feed, should it even be available.

Behind the option of dropping finishing stock early as stores, the next best approach is to apply nitrogen to pastures boost the winter feed flows. Despite the apparent high cost of applied nitrogen, this has emerged as one of the least-cost options when all the factors are considered overall.

If the boost to feed flows proves adequate, the best of all worlds can be gained – the core breeding stock will carry through the winter in acceptable condition to lamb and calve, losses will be lower and retained, and added grazing pressure will effectively use the spring grown feed for profit.

Many farmers appear reserved to apply nitrogen either going into or in winter through concerns of absolute response rates and economic cost benefits. Responses to nitrogen are often slower but may be longer, and will be there if natural growth is occurring.

Although some farmers prefer to base their decisions and judgements on experience and intuition, it may be prudent to obtain consultation on objective feed assessments, feed budgeting and the challenging decision making.

At the very least, a "broad brush" feed assessment must be undertaken immediately. This is simply the likely balance between overall feed demand and supply, and can be calculated by totting up demand in kg of dry matter per day, against the known average monthly growth rates for the locality. At the simplest level, taking 2 percent of various livestock classes' typical liveweight will give a survival if not productive indicator of feed demand.

The obvious conclusion is that if feed isn't available, stock must draw even further on body reserves to get through, with potentially calamitous outcomes.

The Ministry of Agriculture and Forestry acknowledges Bruce Withell, Drought Recovery Facilitator, Manawatu Federated Farmers, for the compilation of this article.

REPAIRING PASTURE DAMAGED BY DROUGHT continued

GRAZING MANAGEMENT OF PASTURES RECOVERING FROM DROUGHT

Where it is not possible to repair pastures, or for those that are only partially damaged, careful management can enhance recovery. Surviving plants should have good access to nutrients (N for grass, P, K and S for clovers) and extra fertiliser applications in early spring may be of benefit to plants and also feed production. Rotational grazing should be practiced because repeated close grazing of plants will restrict growth and spread. A rotation should be started at the end of the drought to allow most of the plants time to replace root reserves. This will enhance future re-growth.

Prepared by Gavin Milne of Agricom on behalf of the Pasture Renewal Charitable Trust.

TABLE 2: SUMMARY OF SPRING-PLANTED CROP OPTIONS

CROP CATEGORY	OPTIONS	SUITABILITY
Summer greenfeed (grazing)	Rape, forage brassica, turnips	Rape and forage brassicas provide multiple grazing. Turnips provide a larger single grazing.
Winter greenfeed (grazing)	Kale, swedes, (or turnips planted in summer)	Swedes are suited to cooler regions. Kale and swedes are both popular with dairy farmers for contract winter grazing.
Conserved feed (silage/hay)	Triticale, barley, Italian ryegrass, maize, lucerne	Maize silage suits warm districts. Triticale can be planted in early-spring and barley in mid-spring for whole crop silage. Italian ryegrass can provide multiple cuts.
Grain crops	Barley, wheat, triticale	Currently at good prices – require some skill to achieve reliable yields.

USING NITROGEN FERTILISER TO BRIDGE POST-DROUGHT FEED DEFICIT

HILL COUNTRY farmers are currently facing a number of issues as a result of drought and many farmers will already have made some difficult choices around stock numbers and feed supply.

One option is to increase pasture growth rates by applying nitrogen (N) fertiliser. The use of N fertiliser will boost feed supply going forward through winter and into spring.

Nitrogen inputs to our pastures are traditionally mainly from symbiotic nitrogen fixation by rhizobia in nodules on clover roots. Nitrogen supply is the dominant nutrient deficiency for New Zealand pastures and nitrogen fertiliser is increasingly being used to improve the N economy of pastures. Most New Zealand pastures are chronically N deficient and will respond to added N at any time when it's not very dry or very cold.

Although the recent rises in nitrogen prices and decrease in sheep and beef returns has changed the profitability equation for many hill farmers, it probably is still the cheapest form of supplementing feed and is a profitable option in the long-term.

Its use can be regarded as a means of minimising inevitable financial losses in the aftermath of a drought. And looking longer term, fertiliser N use may provide useful options, for example, the most profitable response at a whole-farm level might be to retain some classes of stock that were to be sacrificed because of low covers. Similarly, reducing weight on the ewes may save on feed costs right now, but this will have a knock-on effect to next spring's lambing, next year's mating and lambing, and so on. Many of the destocking options also have big ramifications in the harvest of next spring's feed supply. It would be relatively easy to see the 1000 kg DM/ha lost in this year's drought being lost again next spring as unutilised feed. Also, running the farm through winter and into spring at very low covers will impede the pasture's ability to grow its way out of the winter trough.

The optimum solution can really only be arrived at by doing a full farm systems analysis, looking at least 12 months forward. The recently released Farmax Lite feed planning tool is an example of an aid that can be used to do such an analysis. If farmers don't have the resources to do the analysis themselves, they should consider using an experienced farm consultant to do one for them. To do such an analysis requires a range of assumptions to be made. In a FarmaxPro farm system analysis done by AgResearch recently, it was found that applying N to reinstate the winter feed bank was less costly than dropping capital stock, reducing liveweight and performance of breeding and finishing stock or buying supplements. The only strategy that outperformed N in terms of less cost, was dropping finishing stock now on the store market for reasonable prices.

In general, responses to autumn-applied N are less reliable than responses in late-winter/early spring, maybe because N deficiency is a bit more variable in autumn but is more certain in late winter/early spring when pastures are normally starved for nitrogen. Response efficiencies of 10–20 kg DM/kg N applied can be expected to occur. These responses may occur slowly over a long period when pastures are slower growing, or quickly over a shorter period when pastures are faster growing.

The only strategy that outperformed nitrogen in terms of less cost, was dropping finishing stock now on the store market for reasonable prices.

The general rule is the application of the same fertiliser N rate at different times of year will give about the same response in total but with different rates of response and durations. However, responses to fertiliser N application eventually cease over time, that is, the increased pasture growth rate doesn't just continue, and this is because N loss occurs as it cycles through the soil-pasture-animal complex.

There is a common belief that fertiliser N applied in winter will not be effective. Rather than focusing on the seasonal effect, it is probably better to think about temperature as the indicator of whether significant responses will occur. In colder parts of New Zealand pasture growth will be very slow in the middle

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months of the year because of cold temperatures. Hence the potential for responses to N fertiliser is low, or where pasture growth is virtually zero potential for responses will be pretty well non-existent. In warmer parts of New Zealand such as Northland or coastal North Island, pasture growth is relatively high right through winter and large responses to winter application of fertiliser N have been recorded. A good rule of thumb is that if pasture growth rate is very slow or zero because of cold temperatures, then responses to fertiliser N can be expected to be small until base growth rate picks up.

There is also commonly believed to be a lag before pasture responds after N is applied. There is not a lot of biological sense in this, as nitrogen moves rapidly out of fertiliser particles and into the soil solution once it is applied; hence it is quickly available for plant uptake. There may be a physiological lag for the plant to kick into gear, but most likely

Its [nitrogen] use can be regarded as a means of minimising inevitable financial losses in the aftermath of a drought.

what is perceived as a lag in response is just the time it takes for an increase in pasture cover to be observable and this will take quite a bit longer in winter than in spring.

The general principles outlined above can be used to make the predictions of responses to fertiliser N application that can be used in analysing feasibility of N application, and also when planning feed allocation to the stock on the property.

There are a number of practical issues to consider if the decision is made to apply N fertiliser. One involves getting the fertiliser on the ground at the desired time. Getting the pilot booked early may also be safe as there could be increased pressure on aerial operators and poor weather can result in lengthy delays. It is also important not to be locked in to a predetermined course of action. If the feed situation turns out to be different from that predicted, then N application rate can be increased or decreased, and time of application brought forward or pushed back. The key to making these decisions is information – monitor covers and stock condition through the winter.

A number of guidelines are formulated to encourage high response efficiencies and to minimise nitrogen leaching and gaseous losses and consequent environmental impacts. Some of these recommendations may be in conflict with common farm practice or impractical in some instances and may add extra cost and risk if strictly adhered to. However, the principles they are based on are sound and where possible they should be taken into consideration in planning fertiliser N application programmes. These are summarised below.

- Avoid single dressings at high rates by applying N at rates of 20–50 kg N/ha as these give the most efficient responses and minimise losses;
- Avoid direct application into waterways as this wastes fertiliser and pollutes water;
- Reduce application rates in wetter conditions to minimise the risk of direct leaching of fertiliser immediately after application;
- Avoid applying fertiliser N when soil is saturated as pasture growth responses will be low and potential for losses is high;
- Avoid applying fertiliser N when pasture height is very low as plants have limited ability to grow and utilise added N;
- Avoid applying N when soil temperature is less than 6o^{C} and falling as plant response potential is low in such instances;
- Avoid applying nitrogen during very dry periods as plant response potential will be low;
- Avoid applying N straight after a dry period – wait until some re-growth has occurred so the N applied is effectively utilised;
- Assure that other nutrient limitations have been addressed so response potential is not limited;
- Consider the use of inhibitors through consulting your farm adviser;
- Ensure your farm system allows full utilisation of the extra feed grown.

The Ministry of Agriculture and Forestry acknowledges Greg Lambert, Agricultural Systems Section Manager, AgResearch, for the compilation of this article.

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