



## Living with and managing acid soils

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*Abstract.* On our property, we have lived for many years with the problem of acid soils. We have a combination of deeper red and yellow soils suitable for cropping or introduced pastures and shallow non-arable soils with native pastures. We describe how we establish our sown pastures using pre-cropping or direct drilling, and our fertiliser and liming program to overcome low soil fertility and soil acidity. Soil test results show the benefits of either incorporating or topdressing lime or applying N-Viro Soil. We have achieved better pasture establishment and better response to fertiliser on limed areas, resulting in higher carrying capacities.

Our family partnership of 1114 ha is run with our mother Marj and our wives Beth and Libby. Wool production is the main enterprise - 6500 self-replacing 20.5 micron Merinos. We fatten trade cattle and grow a small area of triticale for stockfeed grain.

The area has an average rainfall of 640 mm with a slight winter dominance, and soils are low-moderately fertile red and yellow podsolis and solodics with surface pHs of 4.1-4.5 (CaCl<sub>2</sub>). The red soils are the most fertile, but cover less than 20% of the property, and in general have been rather too frequently cropped. Often the red soil is in small, elevated, rocky and steep parts of paddocks. Our father sowed Australian phalaris on some of the red ground in the late 1950's and early 1960's and these pastures are still quite good.

Native pastures comprise 50% of the property, particularly on the less fertile soils and non-arable portions. The most productive native pastures contain good subclover and are microlaena (*M. stipoides*) dominant, and are often found on the steeper easterly facing country.

### Establishing sown pastures

Traditionally, oat crops were used prior to sowing introduced pastures. However, we have found triticale gives more herbicide weed control options (especially for Wimmera ryegrass), providing a hotter, cleaner burn prior to pasture sowing. This also gives better control of vulpia (*Vulpia* spp.). The cropping phase allows incorporation of lime prior to sowing pastures the next year. However, in recent years, we have had best establishment results direct drilling the pasture using a converted Connor Shea single disc drill with Caldwell points. We have also had excellent results direct drilling pasture without using a prior cereal crop, with lime topdressed some months previously.

### Why do we use lime?

After using superphosphate on most of the property annually for many years, after the 1980-82 drought we cut back to application every 2nd year. By the late 1980's, P levels had dropped dramatically and pastures were becoming dominated by annual grasses. Under this regime (i.e. supering only every second year), responses were poor, and we became disenchanted with supering.

Because of low production and the fact that soil tests showed many paddocks had a low surface pH (4.1-4.3 in CaCl<sub>2</sub>) and aluminium 10-20% of total cations, we commenced a liming program. We believe this has helped with pasture establishment, and has also been associated with better fertiliser responses. Our records show that our carrying capacity has trended upwards in limed paddocks since the early 1990's. Our average stocking rate (all paddocks) in the early 1990's was 7 dse/ha, whereas from 1996-98 we ran on average 9.1 dse/ha.

However, lime is likely to be only one of several whole farm changes that have contributed to better pasture and livestock production. Other factors include:

- better weed control and reduced weed problems following the use of Triticale prior to sowing pastures.
- more successful pasture establishment, and therefore better sown pastures, using the Prime Pastures Program. Spray following, to achieve good weed and pest control before sowing, the use of Dual® and Talstar® for weed and pest control post sowing, converting the seeder to Caldwell points and direct drilling were the most important components.
- a change from autumn to spring lambing to achieve a better match between seasonal feed

supply and livestock requirements.

- re-instating regular supering. This is however, done selectively. Some pasture paddocks (especially those with special uses such as for lambing) are supered each year, as are the better native/sub clover pastures. The less productive native paddocks on poor or shallow soils generally remain unsupered.
- use of high density stocking (50-200/ha) at certain times of the year to improve pasture utilisation and reduce selective grazing of sown species.
- implementation of PROGRAZE skills to match livestock and pasture needs.

### The cost of liming

While we have followed a farm plan since the early 1990's, this has not been approved by DLWC, and we have not claimed lime application as a Landcare cost at this stage. For the last couple of years we have used N-Viro Soil rather than lime, and have been pleased with the excellent crop responses, especially in wet years. Certainly the grain cropping helps cover some of our costs, provides greater opportunity to control annual ryegrass and Paterson's curse, allows us to incorporate the lime and provides us with feed grain. However, we are close enough to the grain growing areas to be able to purchase stockfeed at good prices, and we may move away from cropping if topdressing with lime is found to be as effective as incorporation in the longer term. Conversely, current wool prices may cause us to re-assess this plan.

### Soil test results

Recently we have soil sampled several paddocks which have had either topdressed or incorporated lime applied, and the results show:

- Topdressed lime has moved into the soil as shown by the increase in soil pH in the 5-10 cm layer.
- Where sufficient lime has been applied (approx. 2.5 t/ha), pH has been raised approximately 1

pH unit (0-10 cm sample) and Al reduced below 5% of total cations.

- When lower rates are used, beneficial effects (as measured by soil tests) seem to disappear in as little as 5 years.
- 4 t N-Viro Soil/ha (incorporated) gave a similar change in soil pH and % Al to 2.5 t lime/ha (topdressed).

### An example - the phalaris paddock

While this paddock still contains a good stand of phalaris (established in 1950's), it now has a surface pH of 4.3 (0-10 cm) with 6% Al. The adjacent paddock, which is very similar but has been quite regularly cropped, has a surface pH of 4.1, but the 20-30 cm deep soil test reveals a pH of 5.7. This suggests that the surface soils on the property have acidified significantly compared to the subsoil.

While the phalaris paddock is less acidic than the cropped paddock the, pH is still quite low, indicating that even though sown to a perennial grass, the soil has acidified. This suggests that lime may be a necessary input even in perennial pasture paddocks on high rainfall lightly buffered tableland soils.

### Conclusions

There is no doubt that our soils have been acidifying over the last 30-40 years without lime. Until recently, we have used cereal cropping as a means of incorporating lime, but recently we have had success with topdressing lime and direct drilling pastures without using a cereal phase. Our soil tests show the pH has increased and lime also appears to have moved into the profile. We believe pasture establishment is better, and there are better responses to superphosphate on limed areas. We also appear to be getting animal responses to liming on our property, although we recognise that other management changes have been made which will have had an effect. We believe that proper fertiliser rates and proper management must be used to take advantage of liming.