

## THE PRODUCTS AND THE PROFITABILITY:

# PUTTING IT TOGETHER

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*Abstract: Rapid declines in soil pH and pasture production are likely to occur over relatively short periods (<10 years) when fertiliser strategies are used which are biased toward short-term pasture response rather than long-term sustainability. The use of alternative fertilisers and lime will improve production by lowering pH and increasing availability of some nutrients. Improved pasture production has been obtained at "Rhondda Villa" wherever lime has been applied as a topdressing. This restores pH to former levels in about half the time that it took to acidify. To maintain pH at a desirable level requires a more balanced approach. Details of a strategy which has proved to be successful at "Rhondda Villa" is given.*

## INTRODUCTION

My property, "Rhondda Villa" is located in the Central Tablelands of NSW 38 km south of Orange and 13 km west of Carcoar. My comments and experiences relate to tablelands conditions, but I believe these could have wider application to similar environments in southern Australia.

The holding which now totals 700 ha has been built up as follows since I took over the original properties in 1968:

- 1968 "Rhondda Villa" - 200 ha, "Evergreen" - 70 ha
- 1976 "Springside" & "Kangaroo Flat" - 160 ha
- 1981 "Errowanbang" - 150 ha
- 1990 "Hillview" - 122 ha

These blocks are run as a whole farm as far as resources and management decisions are concerned.

## FEATURES OF THE HOLDING

### Livestock

Fifteen to seventeen hundred first cross ewes are joined to first cross Suffolk/Dorset rams for fat lamb production. The cattle herd of approximately 700 head includes: 80 stud Hereford cows for breeding bulls for sale from Rhondda Villa Hereford Stud; and 150 commercial cows plus steers and heifers *etc.*

### Rainfall

The 700-800 mm annual rainfall is both adequate and reliable. I believe this is what we have paid for so we must utilise it to the fullest or else we may as well farm in a drier or less reliable rainfall area. Whilst some provision is made for 1 year in 10 to be dry, it does not occupy a lot of my planning or resources. Winters are no longer a problem as

good production can be achieved right through that period with suitable pastures and management.

### Soil type

The soils are variable, ranging from basalt and andesite to slate/shale, but mostly good in its natural state. The variation is an advantage across the property as it can extend the growing season as well as the time of peak growth.

### Topography

Due to the undulating to steep topography, not a lot of the country is arable. However, with care, most is accessible by 2 or 4WD vehicles, tractors and ground spreading equipment.

### Trees

The area was originally well treed with white and yellow box, some gums and apple box. Most of the timber remaining today is very old and losses are being experienced. However, with changes in fertiliser practice and since ceasing aerial spraying work, losses have been significantly reduced in more recent times. Tree lots have been planted, but unfortunately only on a small scale to date.

### Pastures

Initial pasture improvement work carried out on "Rhondda Villa" and "Evergreen" between 1968-74 was based on phalaris and clover, some ryegrasses coupled with high rates of single superphosphate (up to 400 kg/ha/yr) with Mo added every 4-5 years. This was working well up until mid 1970's and the same program was commenced on "Springside". However, establishment was very poor on "Springside" and by mid- to late-1970's, all the clovers had disappeared on all areas despite continued top-dressing.

Trial sites were established on various parts of the property, but there was no significant responses to P or S which were main sources of concern at that time. By the time we



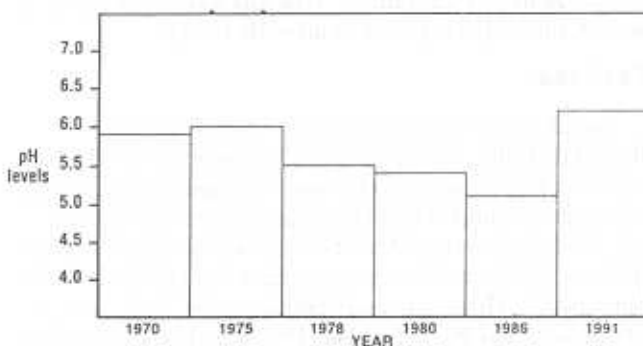
purchased "Errowanbang" in the late-1981, production had fallen from the mid-1970's level of 15 DSE/ha to only 7.5 DSE/ha. As far as I can ascertain, much of "Errowanbang" was sown to phalaris in the late 1930's, and most had not been touched since except for topdressing with single superphosphate every few years. It was also suffering from the same symptom as the other parts of my property, viz. no clovers and stock leaving rank unpalatable grasses uneaten.

I decided to try to renovate these 'run down' pastures by sowing pastures using conventional means. The immediate result was that I could not get anything to re-establish once the old phalaris tussocks were removed. Thankfully, only 10 ha of good phalaris were destroyed, something that will never happen again. It should be noted that the cost of establishing a pasture is around \$150/ha plus the opportunity cost of having the paddock out of production during the establishment phase which could add another \$150/ha to the cost.

Recommendations at the time from the Department of Agriculture, supply companies and from soil test results was to apply 125 kg/ha single superphosphate with molybdenum every 5 years. Having been there, done that and seen production decline I called in outside advice and following the visit of a New Zealand farm adviser started on a dicalcic phosphate program. Results were outstanding after one application.

A change in soil test technique to one that gave total nutrient levels in the soil (not just the available nutrients) and an increased understanding of the basis of pH and nutrient availability alerted me to the fact that we were going in the wrong direction. In fact, what we had been doing was unsustainable, as well as expensive. No single superphosphate or similar products have been used on any pasture since 1983. We are now developing "Hillview" using dicalcic phosphate-based fertiliser, gypsum, lime and trace elements. I now believe that if we had used dicalcic phosphate based fertiliser from the commencement of the development of the other properties, we would not have experienced the problems we faced in the early 1980's.

While the use of dicalcic phosphate based fertiliser increased both plant and animal production, I realised it would not correct soil acidity, the underlying cause of our problem. Topdressing pastures initially with 400 kg/ha of



Note: Since pH is measured on a logarithmic scale, small changes in pH are important. For example, pH 4 is 1000 times more acidic than pH 7.

Figure 1: pH (water) readings on Rhondda Villa No. 4 1970 - 1991.

Table 1: Fertiliser history on Rhondda Villa No. 4.

Year	Crop (kg/ha)	Pasture (kg/ha)	Fertiliser Type
1965	124		Single
1966		124	Single
1967		124	Single
1968		124	Single
1970		110	Single + Mo
1971		100	Single
1972		180	Single
1973 Jan		124	Single
1973 Oct		124	Single
1974		110	Single + Mo
1974		360	Single
1975		120	Single
1976		130	Single
1979		100	Single
1982		100	Limesuper + Mo
1986		440	Dolomite/Lime mix + B .025%
1987		1200	Lime
1988		500	Lime/Gypsum/Dicalcic Fert.
1989		100	Dicalcic Fert.
1990		600	Lime
1991		100	Dicalcic Fert.

lime and dolomite was commenced in 1986 over 100 ha. As funds allowed, applications continued until the stage has been reached where all of the property has had approximately 2.5 t/ha except "Hillview" (purchase '90) which has had 1 t/ha.

During this period, phosphorus was applied at a rate of approximately 2-3 kg P/ha/yr with approximately 7-8 kg S/ha/yr. pH tests have shown an increase in the best cases by 1 unit from pH 5 to 6, after a continuous decline over the previous 10 years (Figure 1). Note our lime was top dressed only, not incorporated.

## ANALYSIS OF pH RESULTS

Considering the general trend shown in Figure 1, pH test in 1975 could have been a result of weather conditions and/or laboratory testing technique. The general trend from 1970-1986 with the exception to the 1975 test showed a steady decline in pH.

Once the pH (water) was below 5.5, the loss of production that occurred was evident across the entire property where a similar history of pasture improvement occurred. During this period, there were no inputs of neutralising material (eg. lime, dolomite) to counter this increasing acidity.

A low pH should be seen as a lack of the major elements calcium, and/or magnesium which must remain in balance with each other as well as with all other elements. Low pH can also increase toxicity of some elements (eg. aluminium) and decrease others (eg. molybdenum).

Paddock No. 4 at "Rhondda Villa" was perhaps one of the worst: production was very poor; the soil had lost all its structure; water shedding was a major problem; and any clover plants present would not mature beyond the size of a 50 cent piece. Boron deficiency was also evident. The only mechanical operation used was one pass with an agroprow on the limited 'arable' area to increase the rate of aeration and water intake. No pasture was destroyed.



Phosphorus levels on a recent test, on this paddock are very low at 5 (Bray 1 test), but this does not concern me, as all inputs have been dicalcic phosphate which does not appear to be expressed by the test result. Calcium and magnesium levels and balance of these two is good, but potassium needs to be monitored. The last test in 1986 showed extremely high total levels of P, but low levels of total calcium. The stocking rate (set stocked) on this paddock is now approximately 9 cross bred ewes/ha. Cattle are moved in and out as required to trim grass or to adjust condition of cows.

Phalaris has spread naturally to many areas and is being encouraged by harvesting our own seed and broadcasting over all natural pasture areas whenever we can. In these steeper areas, natural evolution of ryegrasses, native grasses and clovers have produced a very productive pasture. Deep-rooted, competitive pasture plants such as phalaris are seen as essential to the control of weeds, as well as utilising the nitrogen produced by abundant clovers to prevent further pH decline. Spraying for weeds is used only as a last resort and is seen as a result of poor pasture competition not a weed problem as such. A vigorous, dense pasture also seems to cope better with the ravages of the pests such as red legged earthmite, aphids *etc.* Renovation of some old cultivated areas by agroplow has proved beneficial and does not destroy the pasture. Direct-drilling of improved species and/ or oats into some thinner or less competitive varieties has also improved production and vigour of the pasture. This is done without sprays, only heavy grazing before going in with narrow points.

### Water

Natural creeks, springs, and dams with reticulation to small areas, provide adequate water for stock. Low or wet areas are combined into single paddocks to provide control over fluke uptake by stock.

### Fertiliser

Having conducted a program based on single superphosphate and observed declining pH levels over time, we now have a more balanced approach based on the following: lime and dolomite (calcium, magnesium); sulphur (elemental and gypsum); phosphorus as dicalcic phosphate; potas-

sium, boron, molybdenum and other trace elements (*eg.* selenium for stock health and production) as may be indicated by soil test or observation of pastures.

With the current worm population on the increase, improved species of worms are being looked at as an input. Dung beetles are very active in the warmer months with virtually no rank growth evident across the pasture sward. Cattle alone will graze the pasture to a constant lawn-like appearance over the entire paddock. Hopefully new technology (*eg.* Satellite Imagery) may help on decisions on the direction we are going and changes we can make to improve the overall production.

### Stock Health

Since changing fertiliser strategies, stock have shown obvious preference for treated areas with improved utilization of available feed. Sheep receive two summer drenches, cattle up to two years old receive three drenches plus a 5 in 1 vaccination. After that, only the obvious cases of worm infestation are treated. Selenium deficiency was obvious in the early 1970's when drench was used as a treatment. It has become evident again with the dramatic increase in clover growth in the last few years. Selenium chip is spread over the entire property at 0.5 kg/ha/yr and results are being monitored. As pasture reach a balance, bloat is less of a problem and we have very little grass tetany. Control of the protein uptake and condition of joined heifers is becoming a problem.

### Profitability

Definition of profitability can vary with individuals, but in my opinion, farming can be profitable. All I am prepared to say is that our equity in land only in 1968 was 55% of 270 ha and in 1992 it is 83% of 700 ha. The production potential of this land is increasing year by year while the input costs to sustain the pasture (*eg.* fertiliser and pesticides) is falling.

In recent years we have decided to utilize the expertise gained and equipment purchased to correct our own soil problems. Green's Seeds and Fertilisers is run from "Rhondda Villa" by Des and Sally Green with casual staff, sub-contractors and a consulting agronomist. Supplying and applying a full range of fertilisers, lime, gypsum, dolomite and pasture seeds in the tablelands area.