

Lifting expectations and production with lime

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Riverina beef producer and agronomist Sandy Middleton.

Intensifying production to reach a farm's potential in light of rising land prices is triggering a rethink on the use of lime to address soil acidity for Riverina beef producer and agronomist Sandy Middleton.

Sandy and Felicity Middleton and their two young children farm at Mannus near Tumbarumba, NSW, running a self-replacing spring calving beef herd, and are part of a Meat & Livestock Australia Healthy Soils discussion group run by the Holbrook Landcare Network.

"The biggest challenge with soil acidity is that it is a silent issue. It's out of sight and out of mind," Sandy said.

"People will often look at a newly established phalaris pasture which is struggling but not piece together the puzzle when it comes to pH.

"Soil is our biggest asset in farming - we need to invest in lime to manage pH because all the species we are growing in our soils are acid sensitive species: phalaris/sub-clover based perennial pastures with a bit of ryegrass.

"The Mannus region's average rainfall is 800-850mm but in recent years the annual rainfall we have registered has been around 600-620mm.

"When I started as an agronomist around Holbrook, 12 DSE/ha was the norm, but now I have clients doing 18-20 DSE/ha. Running higher stocking rates speeds up

soil acidification so we need to up the rates and frequency of lime applications rather than following what we did in the past.

Soils group

Concern about soil acidity was a key factor in decision making on the farm and a catalyst for the Middletons becoming involved in the Holbrook Landcare Network's Healthy Soil group.

The Holbrook Landcare Network has been running a major acid soils program for a number of years which includes a series of trials sites as well as the Healthy Soils discussion group.

The group has held several workshops addressing soil acidity, its impact on productivity and profitability, the effects of pH stratification in the soil profile and liming practices, including applications rates and methods.

Group coordinator Phoebe Gulliver said the farmers in the district were often waiting until their pH level in the top 10cm fell to between 4.3 and 4.8 (CaCl₂) before applying lime.

"Traditionally lime has been applied with the rule of thumb: 2t/ha every 8-10 years, but this hasn't kept pace with the rate of acidification occurring on farms," she said.

"We are also encouraging producers to soil sample at 5cm increments to clarify where their sub soil acidity layer is, and if it is inhibiting the establishment and growth of pastures even with surface lime."

Mr Middleton said soil acidity was holding back farm productivity and profitability with both topsoil pH and subsoil pH limiting pasture production, especially in dry years. Good rainfall seasons often masked underlying soil acidity issues.

"When I started as an agronomist in 2010 we would clap our hands if we got our pH to 4.8, so our goals have definitely changed," he said.

"Looking at the work done by Jason Condon and Helen Burns from NSW DPI as part of the Healthy Soils group has really highlighted what was possible with increasing soil pH and pasture productivity.

“It has driven home that we were just scratching the surface with our historic lime applications and the rules of thumb people had used in the past are no longer adequate.

“Our farming systems have changed and our lime applications and pH goals need to change too.

“The pH in the top 10 cm of our soil profile ranges from 4.1 to 4.9/5.0, but we are now targeting a pH of 6.0.”

Stratification

Mr Middleton said the Holbrook Landcare Network’s trial on his property covered three different lime treatments and involved soil testing at different intervals down the soil profile to monitor changes in pH and soil conditions.

One treatment involved incorporating applied lime before establishing a new phalaris-based pasture, a second treatment involved a surface application of lime prior to sowing a new pasture, and the third treatment involved applying surface lime to an established pasture.

“We’ve always taken our soil samples as 10cm cores, but occasionally I’ll take a core in the 10-20cm depth if something isn’t right with a pasture,” Sandy said.

“Our involvement in the Holbrook Landcare Network workshops made me appreciate just how much stratification there is with soil conditions changing through the profile – with samples at the trial site taken every 2.5-5cm to identify where the challenging soil conditions are.

“We’ve seen paddocks where the top 5cm has a pH of 5.1, the next 5-10cm interval has a pH of 4.7 and 30 per cent Aluminium while the 10-15cm band has a pH of 4.7 with 46 percent Aluminium which is getting pretty challenging for pasture species.

“We also plan on setting up our own test strips on the farm where we can look at changes in dry matter production and changes in pasture composition as a result of lime applications.

“Benchmarking of our farm business with Holmes Sackett shows that we can achieve a net profit of \$40/DSE. Liming our soils to achieve adequate pH for

improved pasture production will set the foundations for the beef business to maintain this KPI and help us increase our Net Profit/Ha with increased DSE's.

“Resowing a pasture – without lime - costs about \$350/ha as well as the time the paddock is unavailable for grazing.

“Applying lime at 3-4t/ha on a responsive established pasture – with the cost of lime at \$70/t landed plus spreading being around \$255-340/ha - with no loss in grazing is going to be far more effective than resowing. Losing country for 12 months while trying to establish new perennial pastures can be very costly to a grazing enterprise. Not to mention the fact that the new pasture may not bring the increase in production that it needs to make the investment in a new pasture worthwhile in the first place.

“Land values around Holbrook have really jumped in the last two years so it's cheaper to look at improving our efficiency, rather than trying to buy the farm next door in many cases.”

The site at the Middleton's property compliments a major lime research trial being run by the Holbrook Landcare Network which is investigating a range of possible lime rates and application options, and the expected changes in pH in the soil profile over time.

New goals

“We hope the trials will give us figures on the rate at which pH decreases, the time it takes for the effect of lime to move through the profile, and changes in dry matter production,” Sandy said.

“It may be that the new rule of thumb will be that we need to apply lime at a rate to 3.5-4t/ha every 6 years, instead of applying 2.5t/ha every 10 years, to really drive our production system. We don't know, but hopefully this project will provide those answers.”

Mr Middleton said research presented to the Healthy Soils group made it clear it was important to have targets for pH levels for surface levels.

“If we aim for a pH of 5 in the top 10 cm then the subsoil acidity will increase over time, but if we aim to keep the topsoil pH above 5.5, we can have lime moving down the profile where we can lift the subsoil pH over time,” he said.

“We will see better rhizobia function in clovers which will benefit overall pasture production.

Mr Middleton said there were cases where people had great clover content but saw a response in grass growth when they applied urea because their clover’s ability to fix nitrogen was negatively affected by soil pH.

“Lifting pH will increase nitrogen fixation, reduce the need for urea, lead to better root penetration in the soil profile, build soil carbon levels and get better soil structure – it ties in with the MLA CN30 programs and results in a more resilient, productive pasture.

“Lime is a no brainer.”