Soil and Nutrient Management Plan improves fertiliser utilisation

KEY POINTS
- Current fertiliser program wasn’t working effectively, despite high inputs.
- Soil tests were taken across the farm as part of a new Soil and Nutrient Management Plan.
- There were high phosphorus levels, but it wasn’t available to the plants.
- Lime and dolomite was recommended to release nutrients.
- The nutrient efficiency of nitrogen, phosphorus, potassium and sulphur were less than 30% for the whole farm, leaving room for improvement and cost savings.
- Independent advice was highly valued.
- Soil biology plays an important role in cycling nutrients and improving soil structure.
- Soil and Nutrient Management plans recommended to other farmers.

After dairy farming for thirty years you might think there would be little more to learn about soils and pastures, but Millaa Millaa farmers Eddie and Janeene Wallwork now have a totally different view about managing their soil after their involvement in a new dairy industry project Dairying Better ‘n Better for the Reef.

The Wallworks recently took part in one of the first Soil and Nutrient Management Plans developed for Queensland dairy farmers and funded by the Australian Governments Reef Rescue Program. The plans are designed to help dairy farmers improve nutrient use efficiency, but at the same time reducing risks to the environment and water quality.

The Wallwork’s farm consists of 266 hectares of gently sloping red volcanic scrub soils, where they milk on average 180 Friesian cows. “We’ve bred a herd of high producing cows that need highly productive pastures to provide consistent feed,” said Janeene. “Over the years we’ve gradually improved our pastures and we now have Kikuyu and Setaria established across the whole farm.”

“Maintaining a steady production of quality pasture is a real challenge on the Tablelands,” said Janeene. “We are often faced with extremes in hot, cold, wet and dry.”

“Nitrogen and phosphorus fertilisers have been important in maintaining productive pastures,” said Janeene. “Over the past few years we’ve applied more nitrogen as we can afford it. Last year we applied 200 kg/ha of Urea and 300 kg/ha of CK 66 on our higher productivity areas.” This equates to an application rate of 126.5 kg/ha nitrogen, 38.4 kg/ha phosphorus, 54 kg/ha potassium and 3 kg/ha sulphur.

“The plan came at the right time for us,” said Janeene. “We were wondering why the pastures
hadn't responded as targeted with the increased amounts of fertiliser being used.”

“We were aware of problems with soil structure and the locking up of phosphorus in the soil, but didn't know how to fix it,” said Janeene. “Through our involvement in the Soil and Nutrient Management Plan we discovered that the soil was fertile, but the plant couldn't get access to some of the nutrients.”

In all, 10 soil samples were taken from across the farm and tested as part of the development of the plan. The end results showed that although the Colwell phosphorus levels ranged from medium to very high, which is typical of intensive production systems on the volcanic Red Ferrasols of the Atherton Tablelands, the applied phosphorus was being tightly held by the high levels of iron and aluminium and was not readily available to plants.

“From the plan we discovered that some elements were missing which is why our current fertiliser program wasn’t working,” said Janeene. “Lime and Dolomite were recommended across the farm to raise the pH and release the phosphorus locked up in the soil, making it available for plant uptake.”

**Scope to improve nutrient use efficiency**

The Wallworks also found some interesting facts about their nutrient use efficiency. “The Whole Farm Nutrient Budget showed that there were significantly more nutrients entering the farm than leaving it in saleable products,” said Janeene. “The overall nutrient efficiency was less than 30%.”

A farms’ nutrient efficiency is determined from the amount of nutrients leaving the farm (in saleable products such as milk, grain, hay and cattle), as a proportion of the total nutrients coming onto the farm (in items such as fertilisers and feeds).

According to Dr Cameron Gourley, Leader of the National Accounting for Nutrients Project, phosphorus use efficiency below 30% is not unusual on many dairy farms. Re-using farm effluent, manures and feed wastes can improve nutrient use efficiency and also reduces fertiliser costs. This also helps to reduce the risk of nutrient build up in productive and unproductive areas of the farm, where it can add to the potential environmental risks of nutrient loss to the broader environment.

The reuse of manure and effluent also improves soil health. Animal manure is an important source of food for soil life, responsible for improving soil structure and cycling of nutrients. The added nutrients in manure also promote higher plant growth and increases soil organic matter.

The recommendations in the Soil and Nutrient Management Plan left the Wallworks with an interesting challenge. “This is food for thought,” said Janeene. “Now we need to work out how we can get the effluent to a wider area and use it as part of our fertiliser program?”

A map showing the potential risk of phosphorus runoff. The colours represent the levels of risk.
Independent advice is highly valued

The Wallworks appreciated the on-farm visit and independent advice that came as part of the plan. “It’s good that the recommendations don’t come from someone with a vested interest,” said Janeene. “The recommendations were practical and scientifically based.”

“The interpretation of soil tests was very good and we now have a better understanding of soil biology,” said Janeene. “Soil biology has an important place in the environment. The soil isn’t just a medium to hold up grass.”

Managing environmental risks

The Soil and Nutrient Management Plan included maps showing areas on the farm where phosphorus and nitrogen have accumulated. In these areas fertiliser application can be reduced, saving money and reducing the potential risks to water quality. “It is useful to have the document,” said Janeene. “It’s a tool to show we are managing our land responsibly.”

When the plan was documented, the groundcover was an amazing 95% to 100%. This has been the result of herd rotation in response to pasture condition and feed availability. The farm has also been designed so that each paddock can be accessed via the concrete laneways.

The Wallworks are pleased they’ve had the opportunity to develop the Soil and Nutrient Management Plan for their farm. “I would highly recommend that other farmers do it also,” said Janeene.

An excellent series of concrete laneways has been established across the farm

The Wallworks have a number of highly regarded environmental practices in place on their farm. The riparian areas along the creek have all been fenced off and excluded from all regular stock activities. An excellent series of concrete laneways has been established across the farm with well vegetated roadsides.