



Compost for dairies – a case study from Glenmar Holsteins, Glencoe, SA

Who

Adrian and Sue Young,
Glenmar Holsteins

Where

Glencoe, South Australia

What

Dairy cattle and stud

Aims

- improve microbial activity in soil
- increase mineralisation of nutrients
- improve moisture retention in soil

Outcomes

- increased microbial activity demonstrated by greater mineralisation of nutrients
- reduced use of synthetic fertiliser by 30-40%
- increased moisture retention
- higher proportion of legumes in pasture
- higher protein hay cut from pastures
- increased self-seeding of pasture



Glenmar Holsteins

Adrian and Sue Young own Glenmar Holsteins, a dairy and stud in Glencoe, near Mt Gambier in the south east of South Australia. They milk around 300 cows and their stud has produced multi-award winning dairy cattle. The pastures at Glenmar are irrigated with centre pivots and are a combination of perennial and annual ryegrass as well as clovers.

Water logging, drying down and grazing events at high stocking rates are part of the normal cycle on a dairy farm. These activities stress pastures as large quantities of nutrients are removed from the system and the soil is exposed during summer. This leads to a decline in soil structure, microbial activity and general soil health.

Why compost?

The Youngs noticed that one of their pastures on a light sandy soil was showing signs of nutrient deficiency, despite a history of synthetic fertiliser use.



Soil tests indicated that nitrogen and other major nutrients were in the upper end of the desired range, yet the plant tissue tests indicated low values. Organic carbon levels were also low compared to other pivots on the property and while nutrients were present in large amounts, these weren't getting to the plant because of low microbial activity. Microbes help breakdown nutrients in organic matter to a form that is available for plants.

In this pivot, the soil was low in organic matter and had poor moisture retention resulting in low microbial activity and minimal nutrient cycling. Poor moisture retention in the pasture also meant that the plants weren't developing good, deep root systems, which should have been evident in the light, sandy soil.

The Youngs were nearly ready to give up on this pasture and move the pivot to another location. They spoke to their consultant, Rick Jordan from Advantage Ag, and decided to trial compost to help unlock (mineralise) the nutrients in their soils. They were also looking for longer term results than the short term effects they were seeing with synthetic fertilisers.

“Soil tests showed the nutrients were there, they just weren't getting to plants.”

Rick Jordan, consultant

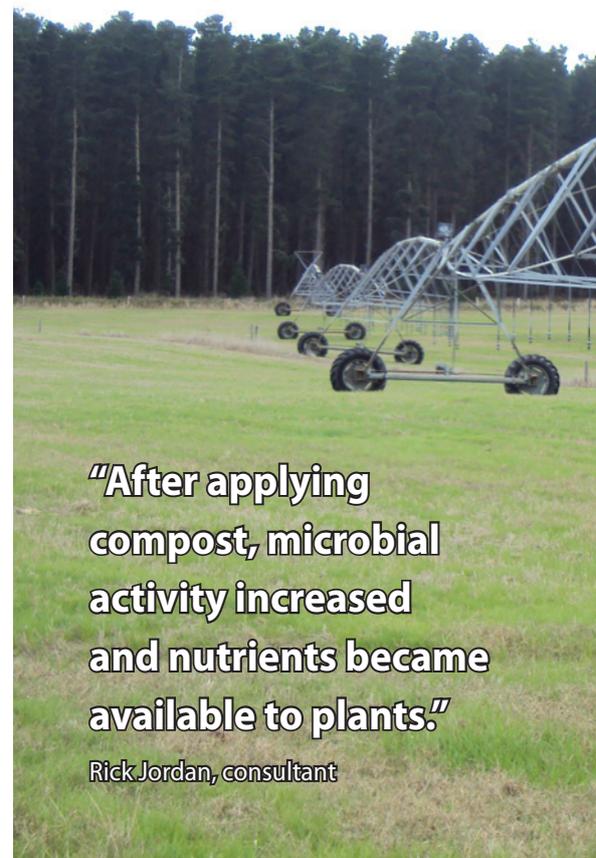
The Youngs understood that for compost to do its job and increase organic matter and microbial activity in the soil, the soil conditions, particularly moisture levels, needed to be right. They also wanted to see if compost could improve the water holding capacity of the soil. With decreasing water allocations, it is that it is more important than ever to optimise irrigation efficiency.

What is mineralisation?

Low organic carbon, low organic matter levels and inconsistent irrigation can lead to poor water retention and low levels of microbial activity in soil. In some cases, sufficient nutrients may be present in the soil but they aren't taken up by plants as they are not in a plant available form.

Mineralisation is the process by which soil microbes breakdown nutrients in organic matter to a form that can be readily taken up by plants. Microbes in the soil feed on organic matter, and this stimulates microbial activity and mineralisation.

Compost is a good source of organic matter and increases microbial activity by supplying a food source. Microbes play a crucial role in nutrient cycling.



“After applying compost, microbial activity increased and nutrients became available to plants.”

Rick Jordan, consultant

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“With synthetic fertiliser we’d see short term benefits, but no long term gains.”

Rick Jordan, consultant

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Poor sandy soil

The results

The Youngs saw a visible response in the pasture within 14 days of applying compost. Growth increased and tissue tests showed improved microbial activity had increased nutrient uptake by plants. Nutrient uptake increased more than expected, compared to previous synthetic fertiliser applications, and root growth in spring also increased substantially. Soil tests will be conducted in autumn next year to see how organic carbon levels have improved in the pasture. It is early days in the program but the results are on track so far.

Compost application also caused a shift in the pasture composition, with white clover now almost twice as abundant. The higher proportion of legumes in the pasture, as well as an increase in foliage, meant that the Youngs were able to cut higher protein hay and more of it! Feed tests will be conducted to determine just how much the protein levels have increased. The Youngs have reduced synthetic fertiliser applications by 30–40% because their fertiliser use efficiency has increased. A 30% increase in pasture growth is expected in the coming year.

Improvements in organic matter levels, soil structure and moisture retention has meant more self-seeding in the pasture this year. The Youngs have dropped their seeding rate and if current levels of improvement continue will only seed the pasture every second year.



Soil from an area with a high application rate of compost



The compost product

The Youngs chose a composted pig manure product from a commercial supplier to supply organic matter, organic carbon and stimulate microbial activity. The compost was blended with potash to supply potassium and sulphate of ammonia to supply additional nitrogen and sulphur. This meant that everything the pasture needed could be supplied in one pass.

The previous winter had been very wet so the Youngs waited until spring and employed a commercial contractor to broadcast their compost at one tonne per hectare. This was effectively a topdressing treatment as the compost was not incorporated. The compost cost \$105/ha which was similar in price to a synthetic fertiliser blend of the same nutrient value.

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“With compost you need to know what you’re trying to achieve, choose the right product and get application timing right.”

Rick Jordan, consultant

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“Create an environment for compost to work well and it will.”

Rick Jordan, consultant

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Alan Rex and Rick Jordan from AdvantageAg

The bottom line...

The Youngs couldn't address the nutrient deficiency in their pasture just by applying more synthetic fertilisers as the nutrients weren't getting to the plants. Applying compost and improving soil moisture retention increased microbial activity and made nutrients in the soil more available to plants. Compost also gave them a sustained response. Nutrients were available over a longer period, not just in the short term, helping their pastures recover faster after grazing. Improvements in nutrient availability also translated into higher quality feed for their herd.

Where to from here

In autumn this year the Youngs applied the same composted pig manure and synthetic fertiliser blend. They're aiming to maintain a high level of microbial activity and continue to unlock nutrients in their soil. Further soil and tissue tests will be conducted to see if lower rates of compost can be used and/or if compost application alone provides sufficient nutrients without additional synthetic fertiliser inputs.

For more information on the program contact:



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