

Fertigation for Dairy Pastures

Findings from Year 1 of the Trial

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The first year of the fertigation trial running at McInnes Brothers farm at Harrisville has finished with some interesting findings. These were presented and discussed at a fertigation field day held in January.



About the Trial

The trial was run under a centre pivot in the 2017 autumn/winter months, with Aston ryegrass. One half of the centre pivot area was used for the trial, with one quarter (Q3) fertilised after grazing with Easy N liquid fertiliser, and the other quarter (Q4) fertilised with broadcast urea as a comparison. An Ecodose fertigation pump was purchased, at a cost of \$2,900 (excl. GST) and installed at the pivot site, and the Easy N liquid fertiliser was purchased in 1,000L shuttles (containers) for this trial. Soil moisture monitoring equipment was installed with an Enviropro SDI 12 unit with tipping bucket installed in each quarter to monitor soil moisture content and in-crop rainfall for precision irrigation scheduling. Pasture dry matter yield was measured pre- and post-grazing using a C-Dax pasture meter to compare the two systems. Fertiliser and irrigation events were recorded.

Results from the Trial

Results of the on-farm trial demonstrated a production response in the pivot quarter that was fertigated compared to the quarter that was traditionally fertilised with broadcast granular urea*. The trial highlighted that even greater cost-benefits can be derived when the Easy N is purchased in bulk. For this trial, it was decided to purchase Easy N liquid fertiliser in 1,000 litre Intermediate Bulk Containers (IBC's or 'shuttles') instead of going to the expense of bulk liquid storage in the early stages of the project. However, cost-benefit analysis has revealed that the cheaper price per litre of bulk Easy N will recover the extra cost of bulk storage set-up in the first ryegrass season, making it a wise investment choice.

Over the ryegrass season, bulk Easy N liquid fertiliser cost an extra 1 cent per kilogram dry matter utilised compared to granulated urea. This translated to an extra fertiliser cost of \$2,991.60 over the 18 hectare pivot area. Easy N however yielded an extra 751 kg DM/ha. When you consider that it would cost 35 to 47 cents per kilogram dry matter to purchase lucerne hay for the equivalent extra yield (i.e. \$4,731 to \$6,353), the extra cost of the liquid fertiliser is more than justified (see below table).

The fertigation system also resulted in a labour saving of approximately 18 hours (costed at approximately \$500) over the ryegrass season. This takes into consideration that traditional broadcast application required getting a tractor, hooking on a spreader, filling the spreader and then two hours of tractor driving over the pivot area as opposed to merely pushing a button. Reduced tractor usage also meant additional benefits of reduced fuel consumption, reduced repairs and maintenance, as well as reduced soil compaction and pasture damage. By spending less time on the tractor, human resources can be saved or directed towards alternate activities for even greater efficiencies, such as improved grazing management.

The trial highlighted the importance of obtaining specialist advice prior to installing a fertigation system in order to maximise the benefits derived from improved nitrogen use efficiency. Precision is paramount and it is important that the irrigation system is operating at optimum water use efficiency. Initial setting up of dosing systems requires somewhat complex calculations but once established, the system is very easy to use.

The key benefits of fertigation were found to include:

- Reduced labour requirements;
- Decreased R&M on machinery;
- Fuel savings, less tractor work;
- Could fertilise immediately following grazing, instead of days later;
- Better timing of fertiliser, less volatilisation;
- Reduced soil compaction with less tractor traffic on pasture/crop.

	Fertiliser cost \$/tonne or \$/1000 L	\$ / kg DM utilised	Kg DM utilised / ha	Kg DM utilised / 18 ha pivot	Cost		Benefit	
					Fertiliser cost \$/kg DM / 18 ha pivot	Replacement feed cost @ 35c/kg DM	Replacement feed cost @ 47c/kg DM	
Easy N bulk	516	0.11	9110	163,980	\$18,037.80			
Granular urea	650	0.10	8357	150,462	\$15,046.20			
Difference		0.01	751	13,518	\$2,991.60	\$4,731	\$6,353	

There are, however, some considerations to keep in mind before purchasing a fertigation system. These include the upfront setup cost (e.g. fertigation pump, bulk storage tank). The uniformity of application is only as good as the distribution uniformity (DU) of the irrigation system, therefore it is essential to have a low-pressure irrigation system with good DU. In times of extended wet weather, some fertiliser applications may be missed as irrigation isn't needed. It may still be important to have a spreader for this reason, as well as to apply other nutrient requirements as well as other nutrients apart from N.

The trial will continue again in autumn 2018 for a second year, building on the results from the first year. Some grazing management changes will be implemented, in addition to an improved focus on irrigation scheduling and fertiliser applications.

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* Please note an extra 54 kg N / ha was applied via fertigation compared to broadcast.